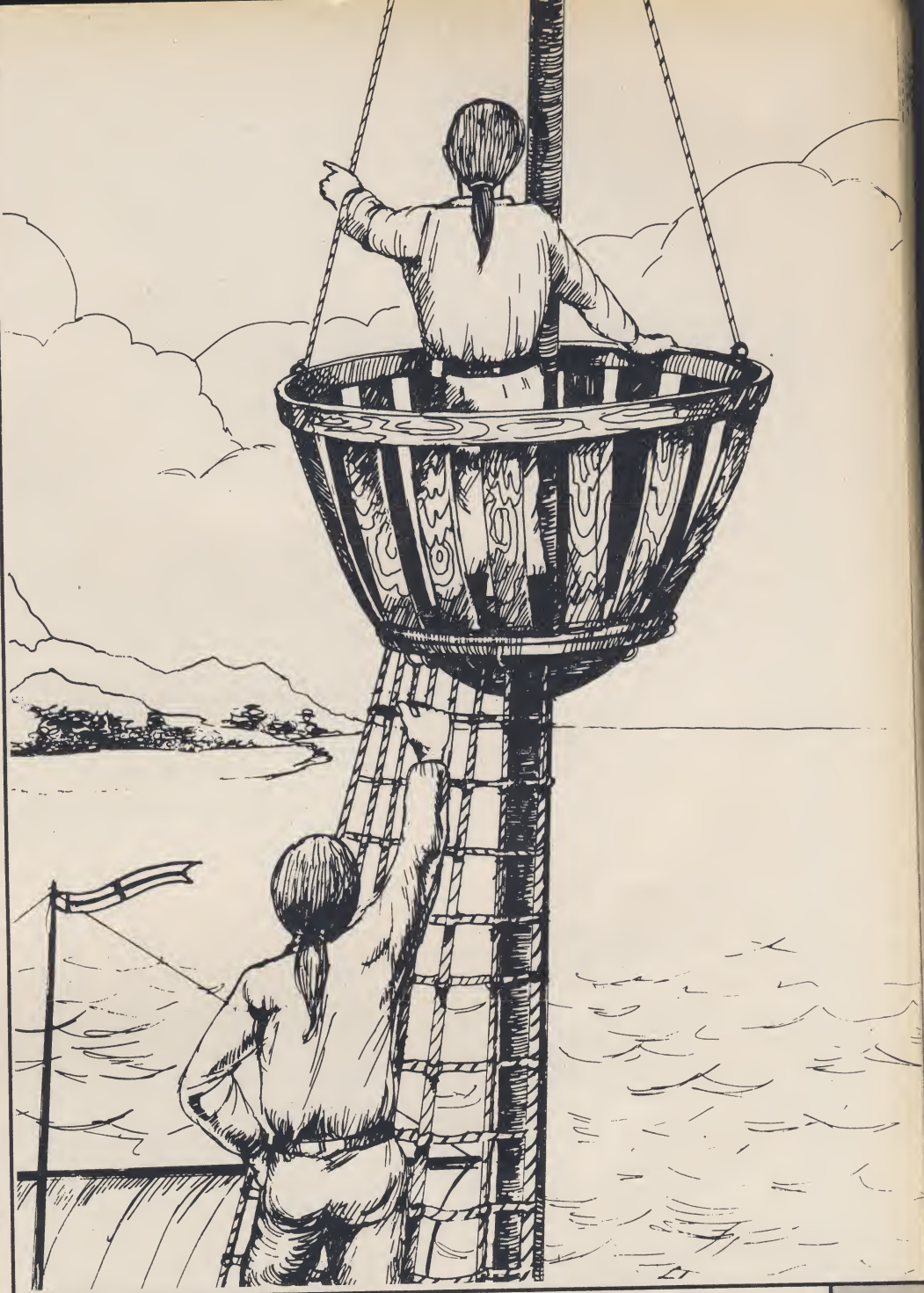


continued from page 108

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6080 IF b(q,13)>1 THEN LET b(q,
k)=INT (b(q,13)*.9)
6082 RETURN
6085 LET a=aa: LET b=bb: LET b(q
,22)=b(q,22)+INT (300*RND): LET
a(b,a)=a(b,a)-10*c: GO SUB 8636
6090 RETURN
6105 GO SUB 65: IF c=q THEN RET
URN
6110 IF c<>b(q,9) AND y$="C" THE
N GO SUB 75: LET m=0: LET n=0
6115 IF c<>b(q,9) THEN RETURN
6117 IF y$="E" THEN RETURN
6120 LET g=1: LET k=q: LET r=b(q
,9): GO SUB 8845
6125 IF g=2 THEN PRINT AT 20,19
;"Enemy";AT 21,19;"attacked": LE
T b(q,28+5*y)=0: RETURN
6127 GO SUB 50: LET a(b,a)=c: LE
T g=5: LET v=b(q,9): GO SUB 8636
: GO SUB 8887: LET g=0
6130 RETURN
6500 PRINT PAPER 6;"N.B. In all
cases, players must occupy the
lands of submissive natives to
control them."
6510 PAUSE h: LET nb=t: RETURN
6700 LET ww=0: FOR k=1 TO p: LET
b(k,8)=0
6710 LET z=1: IF CODE c$(k,1)=32
THEN GO TO 6750
6715 LET b=VAL c$(k,z TO z+1): L
ET a=VAL c$(k,z+2 TO z+3)
6720 GO SUB 50: IF c>6 THEN GO
TO 6722
6721 LET b(k,8)=b(k,8)+c
6722 IF CODE c$(k,z+4)<>32 THEN
LET z=z+4: GO TO 6715
6725 IF z>240-p*20 THEN LET ww=
1
6730 LET b(k,7)=z
6750 NEXT k
6760 RETURN
6800 CLS : PRINT AT 3,0;"You hav
e been recklessly extra- vagant
and owe your Italian bankers
"; INK 2;"f";-INT b(q,6)
6805 LET m=7
6810 IF b(q,19)>2 THEN PRINT AT
m,0;"They refuse to pay for hal
f yournew ships": LET m=m+3: LET
z=19: GO SUB 55
6815 IF b(q,32)+b(q,37)+b(q,42)>
400 THEN PRINT AT m,0;"They ref
use to pay your army: desertio
n is rife.": LET z=32: GO SUB 55
: LET z=37: GO SUB 55: LET z=42:
GO SUB 55: LET m=m+3
6825 IF m>9 THEN PRINT AT 20,0;
"With friends like these ..."
6830 GO SUB 10: RETURN
7000 LET f=0: BORDER 0: PAPER 6:
CLS : PRINT AT 9,2;"All decisio
ns have been made. Their conse
quences will now be revealed
."
7005 GO SUB 10
7007 LET y=0: FOR k=1 TO p: IF b
(k,9)>0 THEN LET y=1
7008 NEXT k: IF y=0 THEN GO TO
7100
7010 PAPER 5: CLS : PRINT AT 1,1
3; INVERSE 1;"WARS"
7012 FOR k=1 TO p: PAUSE h: CLS
7015 LET r=b(k,9): IF r<=0 THEN
NEXT k: GO TO 7100
7017 LET r=b(k,9): IF r>0 THEN
PRINT AT 3,0;FN g$(n$,k);" is at
war with ";FN g$(n$,r)
7018 LET m=4: IF b(k,14)<=0 THEN
GO TO 7032
7020 PRINT AT 4,0;"- invasion by
sea"
7021 PRINT AT 21,0; PAPER 4;"(10
*sp)"; INK 5; PAPER 7;"AAAAAAA
AAAAAAAAAAAA": PRINT AT 20,RND*
3; INK 6;"(2*ig3)": PRINT AT 20,
RND*3;"H";AT 20,2+RND*3;"E"
7022 LET x$="E E E (13*sp)": FOR
x=5 TO 15: PRINT AT 20,32-f*x; I
NK 2;x$(1 TO x): PAUSE 8: NEXT x
: IF f=7 THEN LET f=0: RETURN
7025 IF b(k,14)/(b(r,18)+1)<2 TH
EN PRINT AT 20,11; INK 1;"E E":
PRINT AT m,17;"sea battle": LE
T w=k: LET x=14: LET y=r: LET z=
18: GO SUB 8800: GO SUB 7

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7027 IF b(k,14)<=0 THEN FOR l=1
TO 3: IF b(k,27+5*l)=-1 THEN L
ET b(k,25+5*l)=0: LET l=3
7028 IF b(k,14)<=0 THEN NEXT l:
GO TO 7050
7030 GO SUB 7: PRINT AT m,2;"for
ce landed": LET f=7: GO SUB 7022
: PRINT AT 20,8; INK 2;"II": GO
SUB 7
7032 LET g=0: FOR y=1 TO 3
7033 GO SUB 8850
7034 NEXT y
7035 IF b(k,15)<=0 THEN GO TO 7
050
7037 LET f=7: PRINT AT m,0;"- bl
ockade": GO SUB 7021
7040 LET w=k: LET x=15: LET y=r:
LET z=18: GO SUB 8800: GO SUB 7
7045 IF f=1 THEN LET f=0: LET w
=(b(r,18)+5)/(b(k,15)+5): IF w<1
THEN LET b(r,74)=b(r,74)*w
7050 IF b(k,16)<=0 THEN GO TO 7
095
7055 GO SUB 7: PRINT AT m,0;"- p
iracy"
7060 PRINT AT 20,0;"(32*sp)": PR
INT AT 21,0; INK 5; PAPER 7;"(32
*sp)": LET x$="(sp)E E E": FOR x:

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1 TO 12: PRINT AT 20,x; INK 1;x$
: NEXT x: PRINT AT 20,22; INK 2;
"E E"
7065 LET w=k: LET x=16: LET y=r:
LET z=17: GO SUB 8800: GO SUB 7
7070 IF f=1 THEN LET f=0: LET w
=(b(k,16)+5)/(b(r,17)+5): IF w>1
THEN LET b(k,75)=w-1: IF b(k,7
5)>.4 THEN LET b(k,75)=.3+RND/1
0
7080 PAUSE h
7095 NEXT k
7100 GO SUB 15: LET f=0: CLS : P
RINT AT 1,6; INVERSE 1;"COLONIAL
PRODUCTION": PRINT AT 2,10;"(s
hiploads)"
7101 GO SUB 6700
7102 FOR k=1 TO p: LET b(k,2)=0
7103 IF INT b(k,8)=0 THEN GO TO
7110
7105 LET b(k,2)=(b(k,20)+2*b(k,2
2))/(b(k,8)+1): IF b(k,2)<1 THEN
LET b(k,2)=b(k,2)*b(k,8): GO T
O 7110
7107 LET y=0: FOR x=1 TO INT b(k
,2): LET y=y+1/x: NEXT x: LET b(
k,2)=b(k,8)*y: IF b(k,11)>0 AND
cr=7 THEN LET f=2

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continued on page 114


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7108 IF b(k,63)>RND*50 OR b(k,64)
>RND*h THEN LET b(k,2)=b(k,2)*
(.9-RND/3)
7110 NEXT k
7120 FOR x=1 TO cr+fn: PRINT AT 8
+x,0;FN g$(f$,x): NEXT x: FOR x=
1 TO p: PRINT AT 5,5+(10-p)*x; I
NK x; i$(x): NEXT x
7125 FOR k=1 TO p: FOR l=1 TO cr
+fn: LET x$=STR$(INT (.5+b(k,2)*
b(k,55+1)/h)): PRINT AT 8+1,6+(1
0-p)*k-LEN x$;x$: NEXT l: NEXT k
7130 GO SUB 10: LET g=0
7132 LET l=0: FOR k=1 TO p
7133 IF b(k,74+g)<>1 AND b(k,74+
g)<>0 THEN LET l=1
7134 NEXT k: IF l=0 THEN GO TO
7150+g
7135 IF g=1 THEN GO TO 7151
7136 PRINT AT 1,4; INVERSE 1;"LO
SSES THROUGH BLOCKADE "
7137 FOR k=1 TO p
7138 IF b(k,74)<.1 THEN LET b(k
,74)=.1+RND/10
7140 NEXT k
7142 FOR k=1 TO p: FOR l=1 TO cr
+fn: LET x$=" "+STR$(INT ((b(k,
2)*b(k,55+1)-b(k,2)*b(k,55+1)*b(
k,74))/h)): PRINT AT 8+1,6+(10-p
)*k-LEN x$;x$: NEXT l: NEXT k
7145 GO SUB 10
7150 LET g=1: GO TO 7132
7151 IF l=0 THEN GO TO 7180
7155 PRINT AT 1,2; INVERSE 1;"GA
INS/LOSSES THROUGH PIRACY"
7157 FOR k=1 TO p
7158 IF b(k,75)>.24 THEN LET b(
k,75)=.2+RND/21
7165 LET r=b(k,9): FOR l=1 TO cr
+fn
7166 IF r=0 THEN LET x=0: GO TO
7168
7167 LET x=b(k,75)*b(r,2)*b(r,55
+1)*b(r,74)
7168 LET b(k,76)=0: LET y=0: FOR
m=1 TO p
7170 IF m=k THEN GO TO 7172
7171 IF b(m,9)=k THEN LET y=y+b
(m,75)
7172 NEXT m
7175 LET b(k,76)=y: LET x$=" "+S
TR$(INT ((x-b(k,2)*b(k,55+1)*y)/
h)): IF LEN x$=2 THEN LET x$=" "
+x$
7176 IF VAL x$>0 THEN LET x$(1
TO 2)=" "+x$(2 TO 2)
7177 PRINT AT 8+1,6+(10-p)*k-LEN
x$;x$: NEXT l: NEXT k
7178 GO SUB 10
7180 CLS : FOR k=1 TO p: LET b(k
,2)=b(k,2)*b(k,74)*(1-b(k,76)):
NEXT k
7185 GO SUB 15: PRINT AT 1,9; PA
PER 1; INK 7;"SALES IN EUROPE":
PRINT AT 1,27;t: PRINT AT 3,7; I
NK 1;"Total";AT 4,7;"sales";AT 5
,6;"(loads)": PRINT AT 4,13; INK
2;"Price";AT 5,14;"£)": PLOT 1
35,103: DRAW 0,-8*(cr+fn)
7187 PRINT AT 3,22; INK 3;"Marke
t";AT 4,20;"Share (%)": FOR x=1
TO cr+fn: PRINT AT 8+x,0;FN g$(f
$,x): NEXT x: FOR x=1 TO p: PRIN
T AT 6,16+3*x; INK x; i$(x): NEXT
x
7188 FOR k=1 TO p: LET b(k,70)=0
: NEXT k
7190 LET x=0: FOR l=1 TO cr+fn: F
OR k=1 TO p: LET x=x+INT (.5+b(k
,2)*b(k,55+1)/h)
7192 IF b(k,9)>0 THEN LET x=x+I
NT (.5+b(b(k,9),2)*b(b(k,9),55+1

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)*b(k,75)/h)
7193 NEXT k: LET q(1,5)=x: LET x
$=STR$ x: PRINT AT 8+1,12-LEN x$
;x$: IF x=0 THEN LET q(1,4)=q(1
,4)+INT (RND*5)
7195 IF x>0 THEN LET q(1,1)=q(1
,1)*q(1,2): LET q(1,4)=INT (q(1
,4)+(q(1,1)-x)/q(1,1)*q(1,3)): LE
T q(1,1)=(q(1,1)*3+x)/4
7196 IF q(1,4)<=0 THEN LET q(1,
4)=1+INT (.53*RND)
7197 IF q(1,4) 500 THEN LET q(1
,4)=INT (400+RND*h)
7200 LET x$=STR$ q(1,4): PRINT A
T 8+1,16-LEN x$;x$
7205 FOR k=1 TO p: LET y=INT (.5
+b(k,2)*b(k,55+1)/h)
7207 IF b(k,9)>0 THEN LET y=y+I
NT (.5+b(b(k,9),2)*b(b(k,9),55+1
)*b(k,75)/h)
7208 IF x>0 THEN LET y=INT (h*y
/x+.5): LET b(k,70)=b(k,70)+INT
(y*q(1,4)*q(1,5)*b(k,24)/h)
7210 IF y>0 THEN LET x$=" "+STR
$ y: PRINT AT 8+1,17+3*k-LEN x$;
x$
7212 NEXT k
7215 LET x=0: NEXT l
7220 COPY : GO SUB 10
7225 CLS : PRINT AT 1,5; PAPER 4
;"NATIVE TRADING/LOOTING": FOR k
=1 TO p: LET b(k,2)=0: NEXT k
7230 FOR x=1 TO 21: LET y=0: FOR
k=1 TO p
7235 IF d(x,k)=1 THEN LET b(k,2
)=b(k,2)+d(x,7)
7236 IF d(x,k)=2 OR d(x,k)=3 THE
N LET y=y+1
7240 NEXT k
7245 IF y=0 THEN GO TO 7255
7247 FOR k=1 TO p
7248 IF d(x,k)=2 OR d(x,k)=3 THE
N LET b(k,2)=b(k,2)+INT (d(x,7)
/y)
7250 NEXT k
7260 NEXT x
7270 PRINT AT 3,18;"Value of";AT
4,14;"native trade (£)": FOR x=
1 TO p: LET y=b(x,2)*b(x,74)*(1-
b(x,76)): LET b(x,70)=b(x,70)+I
NT (y*b(x,24)): PRINT AT 6+2*x,2;
INK x;m$(10*x-9 TO 10*x): LET x
$=STR$ INT b(x,2): PRINT AT 6+2*
x,23-LEN x$;x$: NEXT x:
7275 GO SUB 10
7277 LET f=0
7280 CLS : PRINT AT 1,10; INK 7;
PAPER 3;"How to win.": PRINT AT
4,1;"The game ends when one pla
yer has about "; INVERSE 1;60-
p*5; INVERSE 0;" blocks of land.
": PRINT AT 6,1;"Players score"
7285 PRINT AT 9,3; PAPER 5;"1000
"; PAPER 7;" points for each are
a of land";AT 13,3;"and";A
T 16,3; PAPER 5;"1"; PAPER 7;" p
oint for each pound in the
Treasury (or "; INK 7; PAPER 2;
"-1"; INK 0; PAPER 7;" per
pound of debt)."
7286 IF f=1 THEN PRINT AT 20,0;
"(The map for this game is being
generated.)": RETURN
7287 GO SUB 10
7290 CLS : PRINT AT 3,17;"Points
"
7292 FOR x=1 TO p
7295 IF CODE n$(x*8-7)=32 THEN
PRINT AT 5+2*x,6; INK x;n$(8*x-6
TO 8*x): GO TO 7300
7296 PRINT AT 5+2*x,6;FN g$(n$,x
)
7300 NEXT x
7302 LET z=1: LET yy=-10000: FOR
x=1 TO p: LET y=b(x,7)*250+b(x,
6)+b(x,70)
7306 IF y>yy THEN LET z=x: LET
yy=y
7320 LET x$=STR$ INT y: PRINT AT
5+2*x,23-LEN x$;x$: NEXT x
7330 PRINT AT 20,6; FLASH 1;FN g
$(n$,z); FLASH 0;" is winning!"
7340 IF ww=1 THEN GO TO 5000
7350 COPY : GO SUB 10
7430 PAUSE h: CLS : PRINT "EVENT
S": PRINT " ": FOR k=1 TO p
7432 LET z=1
7450 LET x=b(k,8)/(b(k,7)+1): IF

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x<.6 THEN LET x=.6
7452 IF x>1.1 THEN LET x=1.1
7455 LET b(k,20)=INT (b(k,20)*x)
7457 FOR y=1 TO 3: LET b(k,27+5*
y)=INT (b(k,27+5*y)*x): NEXT y
7460 LET b(k,22)=INT (b(k,22)*x
-.2)): IF x<.2<.6 AND RND>.7 THE
N PRINT "Epidemic among ";m$(k*
10-9 TO k*10);" slaves"
7470 FOR x=1 TO 21
7472 IF d(x,k)=0 THEN GO TO 748
5
7475 LET y=INT (RND*1.9-RND*1.9)
7480 LET w=d(x,k): IF y<0 AND w
+y<6 AND w+y>0 THEN LET d(x,k)=
w+y: PRINT "The ";e$(x);s$(d(x,k
)*12-11 TO d(x,k)*12);FN g$(n$,k
): IF d(x,k)=1 AND nb<>t THEN G
O SUB 6500
7485 LET d(x,7)=INT (d(x,7)*(1-R
ND/3+RND/3)): NEXT x
7490 NEXT k
7500 PAUSE h: CLS : IF RND>.85 T
HEN CLS : PRINT AT 9,0;"The POP
E proclaims peace between Christi
ans. No wars are allowed next tu
rn (except against the natives
.)": FOR k=1 TO p: LET b(k,5)=0:
NEXT k: GO TO 7900
7515 LET w=0: FOR k=1 TO p
7516 IF b(k,11)>1 THEN LET w=1
7517 NEXT k: IF w=1 AND cr=7 THE
N LET cr=9
7520 IF RND>.9 AND cr>8 AND cr<1
1 THEN LET cr=cr+1: CLS : PRINT
AT 9,0;FN g$(f$,cr);"is introdu
ced into the New World.": GO TO
7900
7540 GO SUB 60: IF b(k,6)>h AND
RND>.85 THEN PRINT AT 9,1;"Pro
ducts from the East Indies dis
rupt demand for your goods.": FO
R l=1 TO cr: LET q(1,1)=q(1,1)*(
1-RND/2): NEXT l: GO TO 7900
7580 CLS : GO SUB 60: IF b(k,6)>
RND*h AND b(k,24)>.25 AND RND>.5
THEN FOR x=1 TO p: LET b(x,70)
=b(x,70)*(1-b(x,24)): NEXT x: PR
INT AT 9,0;"All states are affec
ted by tax evasion, (some more
than others)but savage penalties
ensure that it is a short-lived
phenomenon.": GO TO 7850
7600 CLS : GO SUB 60: IF b(k,6)>
RND*h AND RND>.5 THEN PRINT AT
9,1;"Your (mercenary) forces dem
and a pay rise.": LET m2=INT (m
2*1.2): PAUSE 300
7620 LET w=1: FOR k=1 TO p:
7622 IF b(k,25)>b(w,25) THEN L
ET w=k
7625 NEXT k: IF b(w,25)=1 THEN
GO TO 7900
7630 CLS : IF RND>.6 THEN PRINT
AT 9,0;m$(10*w-9 TO 10*w);" shi
p design boosts";AT 10,0;"recep
ts from entrepot trade.": FOR k=
1 TO p: LET b(w,70)=b(w,70)+(.1*
b(k,70)/b(k,24))
7900 GO SUB 10: GO TO 200
8000 DIM a(17,21)
8005 LET m=2+RND*4: LET n=RND*5-
RND*5+3
8010 FOR x=1 TO 21
8015 LET m=m+RND*3-RND*3: LET n=
n+RND*4-RND*4
8020 IF m>6 THEN LET m=6-RND*2
8025 IF m<0 THEN LET m=RND*3
8030 IF n<0 THEN LET n=RND*3
8035 IF n>10 THEN LET n=10-RND*
3
8037 IF x=21 THEN LET n=4*RND:
LET m=2*RND
8040 IF m>0 THEN FOR k=1 TO m:
LET a(7-k,x)=1: NEXT k
8045 IF n>0 THEN FOR k=1 TO n:
LET a(6+k,x)=1: NEXT k
8050 IF x<21 AND n<6*RND THEN L
ET a(8+n,x)=1
8055 IF n<7*RND AND RND>.7 THEN
LET a(9+n,x)=1
8060 NEXT x
8065 FOR y=1 TO 21: FOR x=1 TO 1
7
8070 IF a(x,y)=0 THEN GO TO 809
5
8075 LET a(x,y)=INT (3+RND*4.5):
GO SUB 8900

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8080 IF x=1 OR y=1 THEN GO TO 8
095
8085 IF RND>.6 AND a(x,y-1)>1 TH
EN LET a(x,y)=a(x,y-1): GO TO 8
095
8090 IF RND>.7 AND a(x-1,y)>1 TH
EN LET a(x,y)=a(x-1,y)
8100 NEXT x: NEXT y
8200 DIM d(21,7): FOR k=6 TO 26:
LET n=0
8210 LET x=1+RND*15: LET y=1+RND
*19
8215 IF a(x,y)=0 OR a(x,y)>7 THE
N LET n=n+1: IF n<5 THEN GO TO
8210
8217 IF n>=5 THEN GO TO 8250
8220 LET a(x,y)=a(x,y)+10*k: LET
d(k-5,6)=99+INT (RND*1000): LET
d(k-5,7)=RND*2000
8225 IF a(x+1,y)<>0 AND a(x+1,y)
<7 THEN LET a(x+1,y)=a(x+1,y)+k
*10
8227 IF x<15 AND INT (a(x+1,y)/1
0)=k THEN IF a(x+2,y)<>0 AND a(
x+2,y)<7 THEN LET a(x+2,y)=a(x+
2,y)+k*10
8230 IF a(x,y+1)<>0 AND a(x,y+1)
<7 THEN LET a(x,y+1)=a(x,y+1)+k
*10
8235 IF y>2 THEN IF a(x,y-1)<>0
AND a(x,y-1)<7 THEN LET a(x,y-
1)=a(x,y-1)+k*10
8250 NEXT k
8260 RETURN
8410 GO SUB 50: IF a(b,a)>57 THE
N PRINT AT a,b: PAPER c;"G": GO
SUB 6000: RETURN
8412 IF a(b,a)<=57 AND a(b,a)>7
THEN PRINT AT a,b: PAPER c;I$ (I
NT (a(b,a)/10)+.1): GO SUB 6000:
RETURN
8420 PRINT AT a,b: PAPER c;"(sp)
": IF y$="C" THEN GO SUB 8636
8450 RETURN
8500 LET m=1: IF CODE c$(z,1)=32
THEN PRINT AT 13,20;"No coloni
es": PAUSE h: RETURN
8510 LET b=VAL c$(z,m TO m+1): L
ET a=VAL c$(z,m+2 TO m+3)
8515 GO SUB 50: PRINT AT a,b: PA
PER c;I$(z): GO TO 8525
8525 IF CODE c$(z,m+4)<>32 THEN
LET m=m+4: GO TO 8510
8550 RETURN
8600 LET g=0: LET y$="E": PRINT
AT 14-q*2,17;y$
8605 LET 11=0: LET 1=0: LET a=14
-2*q: LET b=17
8615 LET f=1
8617 LET m=0: LET n=0: PRINT AT
15-g,19;"Where ? ";AT 16-g,1
9;"Enter n,s,e";AT 17-g,19;"or w
": LET x$=INKEY$: IF f=2 THEN P
RINT AT 18-g,19;"or x for next";
AT 19-g,19;"force": FOR z=14 TO
21: PRINT AT z,19;"(12*sp)": NEX
T z
8618 IF x$="" THEN GO TO 8617
8620 IF CODE x$=110 THEN LET m=
-1
8621 IF CODE x$=115 THEN LET m=
1
8622 IF CODE x$=101 THEN LET n=
1
8623 IF CODE x$=119 THEN LET n=
-1
8624 IF f=2 AND CODE x$=120 THEN
RETURN
8625 IF (m=0 AND n=0) OR a+m<1 O
R a+m>21 OR b+n<1 OR b+n>17 THEN
BEEP .5,.5: GO TO 8617
8627 LET b=b+n: LET a=a+m: IF f=
2 THEN RETURN
8630 IF a(b,a)=0 THEN LET 1=1+.
04-(t-1492)/1000: PRINT AT a,b;y
$: PRINT AT a-m,b-n: PAPER 5: IN
K 7;"R": GO TO 8660
8635 LET 11=11+.25: GO SUB 8410:
PRINT AT 19,19;"(9*sp)":AT 20,1
9;"Land ahoy!";AT 21,19;"(3*sp)
": IF a(b,a)>7 THEN GO TO 8655
8636 LET w$=STR$ b: IF LEN w$=1
THEN LET w$="0"+w$
8637 LET z$=STR$ a: IF LEN z$=1
THEN LET z$="0"+z$
8640 LET d=b(q,7): IF k=13 THEN
LET b(q,20)=b(q,20)+INT (b(q,21
)*.9): LET x=b(q,20): LET mm=m:

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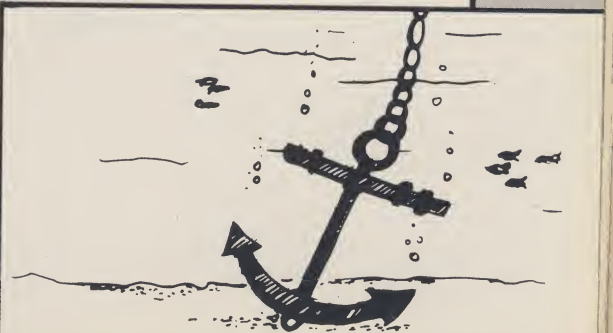
LET m=4: INK 7: PAPER 4: GO SUB
20: LET b(q,21)=0: PAPER 6: LET
m=6: LET x=0: GO SUB 20: GO SUB
15: LET m=mm
8642 IF a(b,a)>0 THEN LET c$(q)
=c$(q, TO d)+w$+z$
8644 LET d=b(q,10): IF a(b,a)=4
OR a(b,a)=3 THEN LET b(q,10)=d+
1: IF a(b,a)=3 THEN LET b(q,10)
=1: LET b(q,11)=b(q,11)+1
8645 GO SUB 50: IF a(b,a)>0 THEN
LET a(b,a)=c+10*q: LET b(q,7)=
b(q,7)+4
8650 IF f=2 OR f=3 THEN RETURN
8655 LET a=a-m: LET b=b-n
8657 IF 11>RND THEN PRINT AT 18
,19;"Ships return": PAUSE h: PRI
NT AT a,b: PAPER 5: INK 7;"R": R
ETURN
8660 IF 1>RND AND b(q,13)>1 THEN
LET b(q,13)=b(q,13)-1: PRINT A
T 18,19;"Ship lost": PAUSE h: PA
USE h: PRINT AT 18,19;"(9*sp)"
8665 IF 1>RND AND b(q,13)=1 THEN
LET 11=2: GO TO 8657
8670 GO TO 8615
8700 IF k=17 AND b(q,7)=0 THEN
RETURN
8702 IF k=14 AND b(q,9)=0 THEN
RETURN
8703 INPUT "Which force (1-3) or
0 ? ";x$
8704 LET n=3: GO SUB 40: LET z=V
AL x$: IF z=0 THEN NEXT k
8705 IF b(q,27+5*z)>b(q,k)*50 TH
EN LET b(q,27+5*z)=b(q,k)*50
8715 FOR x=1 TO 21: PRINT AT x,0
: INK 1:CHR$ (x+96): NEXT x
8720 INPUT "Which row ? (a-u) ":
x$
8725 IF CODE x$<97 OR CODE x$>11
7 THEN BEEP .5,.5: GO SUB 25: G
O TO 8720
8730 FOR x=1 TO 17: PRINT AT 0,x
: INK 1:CHR$ (x+96): NEXT x
8735 INPUT "Which column (a-q) ?
";y$
8740 IF CODE y$<97 OR CODE y$>11
3 THEN BEEP .5,.5: GO SUB 25: G
O TO 8730
8745 LET b=CODE y$-96: LET a=COD
E x$-96
8747 IF a(b,a)=0 THEN PRINT AT
18,19;"That's sea!";AT 19,19;"Tr
y again.": GO TO 8720
8750 IF a+1<=21 THEN IF a(b,a+1
)=0 THEN GO TO 8760
8751 IF a-1>=1 THEN IF a(b,a-1)
=0 THEN GO TO 8760
8752 IF b+1<18 THEN IF a(b+1,a)
=0 THEN GO TO 8760
8753 IF b-1>0 THEN IF a(b-1,a)=
0 THEN GO TO 8760
8755 PRINT AT 18,19;"There is no
";AT 19,19;"sea route.": GO TO 8
720
8760 GO SUB 65: IF k=17 AND c<>q
THEN PRINT AT 18,19;"Not a col
ony.": GO TO 8720
8765 IF k=14 AND c<>b(q,9) THEN
PRINT AT 18,19;"Not an enemy.":
GO TO 8720
8780 LET b(q,25+5*z)=a: LET b(q,
26+5*z)=b: LET b(q,28+5*z)=0: PR
INT AT a,b;"C": IF k=14 THEN LE
T b(q,28+5*z)=-1
8790 RETURN
8800 LET f=0: GO SUB 7: LET v=(b
(w,x)*b(w,25)+1)/(b(y,z)*b(y,25)
+1)*(1+RND/2-RND/2)
8810 IF v<1 THEN PRINT AT m,2;"
attacker defeated": LET b(w,x)=I
NT (b(w,x)-2*b(y,z)/v)
8815 IF v>=1 THEN LET f=1: PRIN
T AT m,2;"defender defeated": LE
T b(y,z)=INT (b(y,z)-v/2*b(w,x))
8820 IF b(w,x)<=0 THEN LET b(w,
x)=0
8822 IF b(y,z)<=0 THEN LET b(y,
z)=0
8825 RETURN
8845 LET w=a: LET x=b
8847 IF b(q,9)=0 THEN RETURN
8848 GO TO 8851
8850 LET g=0: LET w=b(k,25+5*y):
LET x=b(k,26+5*y)
8852 IF w=0 THEN RETURN
8855 LET u=0: FOR 1=1 TO 3: LET

```

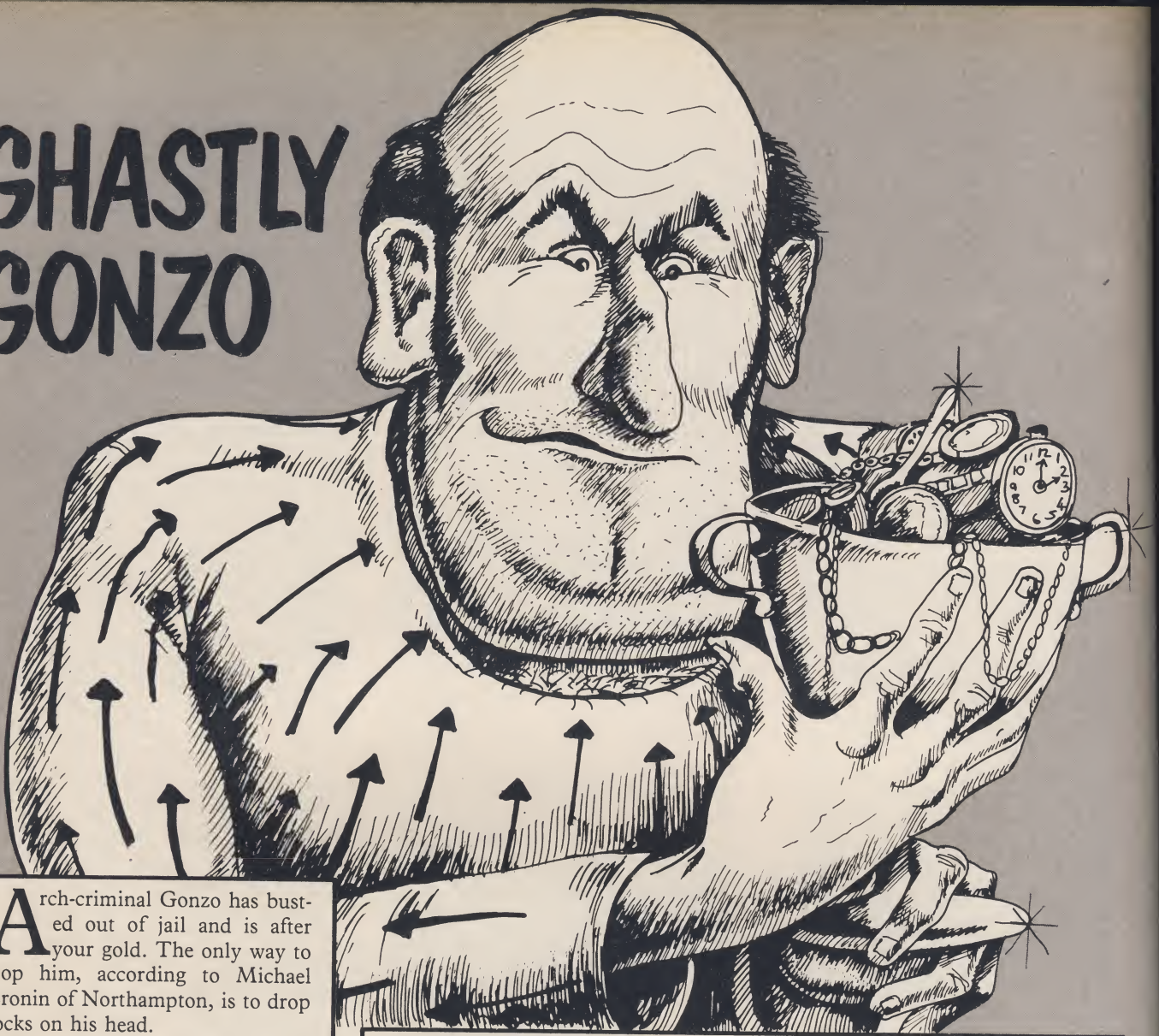
```

co=0: LET o=b(r,25+5*1): LET u=b
(r,26+5*1)
8860 IF w=0 AND x=u THEN LET co
=1
8862 IF g=1 AND co=1 THEN LET 1
=3: NEXT 1: LET g=2: RETURN
8863 IF co=1 THEN GO SUB 8870
8865 NEXT 1: IF co=0 AND INT (a(
x,w)/10)=k THEN RETURN
8868 IF co=0 THEN LET f=3: GO T
O 8882
8870 PRINT AT m,0;"- land battle
": LET v=(b(k,27+5*y)+1)/(b(r,27
+5*1)+1)*(RND/2-RND/2+1)
8875 IF v>1 THEN PRINT AT m,17;
"attacker wins": GO SUB 7: LET b
(r,27+5*1)=INT (b(r,27+5*1)-(v/2
*b(k,27+5*y))): LET f=3: IF b(r,
27+5*1)<=0 THEN FOR z=1 TO 4: L
ET b(r,24+z+5*1)=0: NEXT z
8880 IF v<=1 THEN PRINT AT m,17
;"defender wins": GO SUB 7: LET
b(k,27+5*y)=INT (b(k,27+5*y)-(2/
v*b(r,27+5*1))): LET f=2: IF b(k,
27+5*y)<=0 THEN FOR z=1 TO 4:
LET b(k,24+z+5*y)=0: NEXT z
8882 LET a=w: LET b=x: IF f=2 TH
EN LET q=r
8883 IF f=3 THEN LET q=k
8884 IF INT (a(b,a)/10)<>q THEN
GO SUB 8636
8885 IF q=r THEN LET v=k: GO TO
8887
8886 IF q=k THEN LET v=r
8887 LET z=1: IF CODE c$(v,1)=32
THEN LET b(v,7)=0: LET b(v,8)=
0: RETURN
8888 IF VAL c$(v,1 TO 2)=b AND V
AL c$(v,3 TO 4)=a THEN LET c$(v
,1 TO 4)=c$(v,z+4 TO b(v,7)): GO
TO 8892
8890 IF VAL c$(v,z TO z+1)=b AND
VAL c$(v,z+2 TO z+3)=a THEN LE
T c$(v,1 TO 4)=c$(v,1 TO z-1)+c$(
v,z+4 TO b(v,7))
8892 IF CODE c$(v,z+4)<>32 THEN
LET z=z+4: GO TO 8890
8893 LET b(v,7)=b(v,7)-4: GO SUB
50: LET ti=b(v,10): IF c=4 OR c
=3 THEN LET b(v,10)=ti-1: IF c=
3 THEN LET b(v,10)=ti: LET b(v,
11)=b(v,11)-1
8897 RETURN
8900 IF a(x,y)=5 AND RND>.5 THEN
LET a(x,y)=4
8910 IF a(x,y)=5 AND RND>.4 THEN
LET a(x,y)=6
8915 IF a(x,y)=5 THEN LET a(x,y
)=3
8920 RETURN
9100 LET f=0: LET e=.75
9101 LET a=.5*e: LET b=.25*e: LE
T c=.375*e: LET d=.125*e
9105 BEEP b,9: BEEP a,12: BEEP b
,14: BEEP c,16: BEEP d,17: BEEP
b,16: BEEP a,14: BEEP b,11: BEEP
c,7: BEEP d,9: BEEP b,11: LET f
=f+1: IF f=2 THEN GO TO 9112
9107 BEEP a,12: BEEP b,9: BEEP c
,9: BEEP d,8: BEEP b,9: BEEP a,1
1: BEEP b,8: BEEP a,4: IF f=3 TH
EN GO TO 9115
9110 IF f=1 THEN GO TO 9105
9112 BEEP c,12: BEEP d,11: BEEP
b,9: BEEP c,8: BEEP d,6: BEEP b,
8: BEEP (a+b),9: BEEP b,9: PAUSE
(b*50)
9115 BEEP (a+b),19: BEEP c,19: B
EEP d,18: BEEP b,16: BEEP a,14:
BEEP b,11: BEEP c,7: BEEP d,9: B
EEP b,11: LET f=f+1
9117 IF f=3 THEN GO TO 9107
9125 BEEP c,12: BEEP d,11: BEEP
b,9: BEEP c,8: BEEP d,6: BEEP b,
8: BEEP (a+b),9: BEEP a,9
9130 RETURN

```



GHASTLY GONZO



Arch-criminal Gonzo has busted out of jail and is after your gold. The only way to stop him, according to Michael Cronin of Northampton, is to drop rocks on his head.

Whether or not you can think of more desirable methods of dealing with burglars, **Ghastly Gonzo** runs on the ZX-81 in 16K, and demonstrates how clever use of the character set in Inverse mode can juice up a game's graphics considerably.

[illegible]

```

100 IF G=100 THEN FOR F=6 TO 15
100 IF G=100 THEN PRINT AT F, Y+
100 "AT F,Y+1,"
104 IF G=100 THEN NEXT F
106 IF RAND=Y THEN LET SC=SC-10
0
200 LET DOPE=INT (RAND*7)
201 IF DOPE=1 THEN PRINT AT X,Y
202 IF DOPE=1 THEN LET Y=Y-2 AN
203 IF DOPE=5 THEN PRINT AT X,Y
204 IF DOPE=5 THEN LET Y=Y+2 AN
205 IF F=16 AND Y+1=N THEN LET
HIT=1000
0 IF HIT=1000 THEN PRINT AT 1
0 "HIT"
0 IF HIT=1000 THEN PAUSE 100
0 IF HIT=1000 THEN PRINT AT 1
0 "HIT"
5041 IF HIT=1000 THEN LET SC=SC+
1041 IF HIT=1000 THEN LET LIVES=
+1
LET F=0
LET HIT=0
IF LIVES=0 THEN GOTO 300
IF G=100 AND HIT<>1000 THEN
LIVES=LIVES-1
PRINT AT 17,N-1," "AT 16,
PRINT AT 16,N-1," "
LET HIT=0
LET G=0
NEXT N
GOTO 100
IF HI<30 THEN LET HI=SC
PRINT AT 10,3,"SCORE=";SC;"
HI= HI
PRINT AT 5,5,"GAME OVER"
LET SC=0
LET LIVES=2
PAUSE 200
CLS
GOTO 70
FOR F=0 TO 21
70 PRINT AT F,0,"
330 NEXT F
300 PRINT AT 2,4,"PRESS A KEY F
400 PRINT AT 5,5,"
410 PRINT AT 6,5,"

```

```

420 PRINT AT 7,5;"
430 PRINT AT 8,5;"
440 PRINT AT 9,5;"
450 PRINT AT 10,5;"
460 PRINT AT 11,5;"
470 PRINT AT 2,4;"PRESS A KEY F
480 PRINT AT 5,5;"
490 PRINT AT 6,5;"
500 PRINT AT 7,5;"
510 PRINT AT 8,5;"
520 PRINT AT 9,5;"
530 PRINT AT 10,5;"
540 PRINT AT 11,5;"
650 IF INKEY$="" THEN GOTO 390
660 FOR R=0 TO 21
670 SCROLL
680 PRINT AT 21,0;"
690 NEXT R
700 PRINT AT 0,5;"ASTRO ATTACK"
710 PRINT AT 2,0;"THE DREADED G
ONID HAS ESCAPED" AT 4,0;"FROM
PRISON AND IS STEALING YOUR" AT
5,0;"GOLD THINGS ONLY" AT
6,0;"AT 3,0;"THE ONE DAY"
7 AT 10,0;"TO" AT 11,0;"TO"
8 AT 12,0;"ON" AT 13,0;"HEA
9 IGH" AT 14,0;"THE ROCK
720 PRINT AT 16,0;"OUR MISSION
730 PRINT AT 18,3;"PRESS A KEY
TO PLAY"
740 FOR T=0 TO 25
750 IF INKEY$<>"" THEN RETURN
760 NEXT T
770 PRINT AT 18,3;"PRESS A KEY
TO PLAY"
771 PRINT AT 20,0;"YOU HAVE 20
LIVES YOU GET 50 POINTS PER H
780 GOTO 730

```


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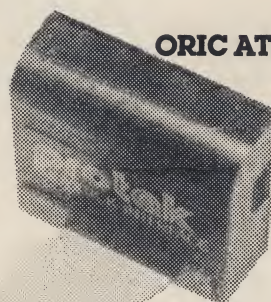
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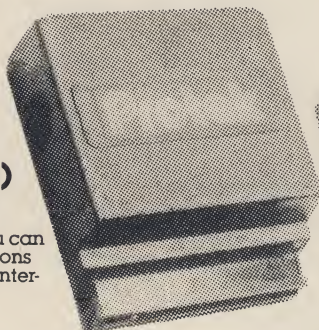


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Illustration: Graham Ward



Escape from the modern world

Richard Price looks at some contemporary adventures

WHEN YOU are on the hunt for a new adventure what is it you are looking for?

You will naturally expect the game to have playability — that combination of technical factors most of us take for granted when we buy commercial programs. You have a right to demand a decent vocabulary, good response time and a flexible interpreter which comes across with some sort of personality during play. You will assume the writers have devised carefully designed puzzles set into a coherent structure.

Those are the requirements of any good game but it is fair to say that an adventure's success and the satisfaction it gives you will be decided mainly by the quality of its plot and the atmosphere it generates.

All of us want an escape into other worlds at times to savour the pleasure of being someone or somewhere else. That

fantasy is the core of the appeal of computer adventure. Fantasy, though, is fragile and, whether you prefer heroic, modern or futuristic scenarios, the setting you make your journey in must hold your belief right to the end.

Quite often people will say that fantasy works by suspending your disbelief. Tolkien himself did not think that was a convincing explanation of the way the mind handles fantasy. In *Tree and Leaf*, his short work about fairy stories, he put forward the idea that the writer — or games designer in our case — creates a 'secondary' world which your mind can enter. Once inside it you believe the general setting, the characters and action are true — meaning that they all obey the proper laws of their own world. The spell held over you may well be broken by some jarring intrusion from the real world or simply because the characters behave in a way that is out of kilter with the logic of their surroundings.

Far too many programs feature plots which, for instance, ask you to rescue a princess, find the scattered bits of some talisman or simply slash your way through a monster-infested cave riddled

with rising damp and littered with treasures which no sorcerer in his right mind would leave lying around.

You may not be too happy to be regularly cast as a Conan-clone whose fist is bigger than his brain. That must be desperately aggravating for female adventurers who are expected to undergo a mental sex-change before powering up their Spectrums. If software companies are going to survive then they had better start looking for games which will appeal to a much wider public than is currently the case.

To be fair, there is a growing variety of styles and plots in the adventure genre but games that use real story lines are still pretty thin on the ground. The concept of bookware, though, seems to be taking off. Creating computer implementations of successful stories has some obvious advantages as the books have already proved that their 'secondary' worlds can hold people's attention and imagination. It still does not mean that the program will necessarily match up to the excitement or invention of the original but if the programmers are sensitive about the adaptation there is a chance of a good fit. Of course, the memory size of home micros also imposes rigid boundaries and limitations.

If you are an amateur programmer searching for a theme there is nothing to stop you turning your favourite pulp fiction into an adventure for home consumption.



At the sign of THE DANCING OGRE

If you are bored with magic and monsters history can provide equally exciting themes. Your heroine or hero could attempt to infiltrate the lair of the Old Man of the Mountains, the original master of the feared Assassins at the time of the Crusades. Deserts, strange nomads, wild mountains and grim fortresses guarded by fanatical killers all have their place in this adventure.

There are some programs which meet all or most of the criteria for successful secondary worlds and yet mirror the preoccupations and paranoid of our own times. They reflect different angles of life and often carry some sharp social comment.

Urban Upstart from Richard Shepherd Software depicts the grim emptiness of inner-city life. Imagine any decaying ex-industrial town in Britain and you will have an idea of what it is like to live in Scarthorpe. No jobs, no money, nothing to do. No one will wander the streets. Thuggish skinheads and paranoid police rule here.

You must comb the town and find the means to escape. Your own character is pretty suspect and not above theft and fraud to raise much-needed cash. The mean streets are depicted in location graphics but the format is traditional text adventure and tricky at that.

The game may not seem like escapism and it is not difficult to recognise parallels with Cut Throat Alley or Grime Street. Definitely a slice of social realism with a gritty, dangerous, feel to it, though not without flashes of humour.

If you are one of those gamers who thinks adventures written on the Quill cannot match the real thing then **Hampstead** could provide a cure for your scepticism. The technical presentation may be defined by the utility but the subject matter and approach is new and genuinely funny.

There you are, stuck in your nasty smelly flat somewhere in the wilderness of north-west London, parked in front of 3-2-1 on the telly. The only way is up — so you think — and you nip out in search of the dole office to get your giro. Outside the back yard, gleaming in the sunlight, is a sign pointing to Hampstead. Nothing can stop you now, so you cross your personal Jordan and pedal towards the Promised Land only to find you cannot attain Hampstead simply by going there. You will have to change your style and your gear, read the right books and do the right things with the right people.

continued on page 124

Up here on the Enkash Moors winter comes early and the wolves have been howling around the fence these last few weeks. The Dancing Ogre is in a lonely spot but the southern caravan route passes close by and a steady trickle of travellers and adventurers will overnight here — especially in this cold season when the nights are long and the beasts of the wilderness grow leaner and hungrier. The tap room is full of talk and argument and I hear tall tales that get taller by the minute after a few cups of Krean wine.

Time after time I meet those who have travelled without success in the icy wastes of Valhalla, the after-world of the northern barbarians. A map in my possession may help Sheila from the township of Cambridge — she seeks Drapnir the ring of power. There are Pits in Hel and if she journeys east from there to a cave she will be able to jump to another part of Hel. North of here lies Despair. North once more will bring her to the ring.

Another lady, known only to me as Byford the Fair, has faced similar problems in that chill place; let us hope she finds solace in this news. Few women pass by the tavern — more's the shame. I would like to know why they go adventuring and how they fare in a trade dominated by men. More power to their sword arms!

Deep in his ale one night, Robert the Nailer, from Devizes Town, confessed he had been searching for the fabled land of Hampstead over many weeks. Though he had boarded a train and met a trader in antiques caller Perrier, he could get no further and was spurned by this odd creature.

In my youth — before I worked as a mercenary for Prince Janga in Maru — I visited the place myself. Set in a maze, amongst the filth and fumes of orcish factories, there is a great treasure. Perrier will be eager to buy this artifact. Robert should thus

find his way open, though final success will still be a long way off. To find the secret of the maze he will have to drop his belongings one by one and make a map, for the place is small but tricky.

My thanks to Mark Talbot, an initiate of great skill from the temple of Surclaif at Loughborough. He has sent me the map to Scarthorpe, that forbidden city of despair. Other students of Urban Upstart should take note — if you do not carry a book on the art of flying with you you will never escape from this dismal place of ruins. The key will also be necessary.

Philip James of North Wales has been examining the intricate and secret codes contained in System 15000. He has found a number attached to the name 'KP Codes' but can't grasp its significance. It is easy to become lost in this strange ritual but it is always wise to return to earlier contacts. If Philip uses this number at Kingsdown he'll discover much to his advantage. Also if you wish to get information from Selcra you must always place a message on the board first — enter 'Selcra' followed by the name of the organisation.

There are still those who brave the Third Continent on the trail of the Black Crystal. Hammerfist Pelaez from London dropped in not two moons ago, tired from his struggles in the Shoggoth's lair. Although he was refreshed by a side of bacon and a stoup of mead I was unable to help him more. He seeks the location of the Shoggoth's treasure chamber and the way out from its prison.

If you pass by the Ogre come in and talk with me — perhaps you have some advice to give him. Whether you need aid or can give it you're welcome up here on the Moors. Safe journey to you all.

Gordo Greatbelly, Landlord.

If you have a tale to tell, or are in need of a helping hand, write to the Landlord of the Dancing Ogre c/o Sinclair User, 67 Clerkenwell Road, London EC1R 5BH.

continued from page 123

Not being totally stupid you will lie, cheat, even steal to get to this Nirvana of NW10 but you must avoid violence at all costs. The game is not merely about finding the right objects — it is also about attitudes as you must work out ways of making the correct deals. The answers are devious.

This is good situation comedy from Melbourne House and the game is attractively presented with a hilarious handbook. It is arguably one of the best Quilled adventures to date.

From this comfortable tweedy fantasy we descend into a shifting, threatening underworld of conspiracy, espionage and fear. A series of audio messages are recorded on your answering machine. Their growing urgency and the sound of a final shot leave you in no doubt — **Valkyrie 17** is active again, a cell of neo-Nazis whose deadly tentacles stretch around the world.

Thanks to the dying gasps of your agent you know their ruthless leader is holed up in an exclusive Austrian skiing resort at the Glitz Hotel. Your job is to seek him out and neutralise him. Take care; one foolish move and you will find yourself face down in the snow rapidly becoming a member of the great ma-

jority.

The level of paranoia is pumped up by ringing phones which, if answered, threaten you and make it clear that your cover is already broken. Everything a good thriller needs is here — locked safes, half-overheard conversations, blood on the crisp snow of the piste.

Valkyrie 17 is produced by the Ram Jam Corporation, a new outfit, and features detailed atmospheric descriptions. The location graphics are interactive and will change to show the results of significant actions. No help is given and you are absolutely on your own in a race against danger.

Isolation and danger are also the major themes of **System 15000** from AVS. This is no standard text adventure but it is definitely one of the most gripping and compulsive Spectrum games so far. A brief note informs you that Comdata Company has been ripped off for a cool million or more bucks in a computerised bank fraud. Lurking behind the heist are the mob, ominous and menacing. Your single lead is one phone number.

On loading you will find only the user screen of the 15000 network and the basic instructions on how to operate it. From that beginning you must pene-

trate the files of the other computers which use the net to uncover the twisting threads of the plot. The giant mainframes of the international banks are well protected against intruders and police data protection squads will shut the system down temporarily once they get a sniff of what you are up to. Stay cool and keep dialling — piece by piece you will edge your way towards the truth and attempt to restore the Comdata lost millions.

Your only input routines are phone numbers and an occasional cryptic note on the message board. There is no need to take on any role — this is you against the network in the here and now, deep in the loneliness of the long-distance hacker.

After hours of tracing leads you will find yourself cheering in triumph as you enter the files of the Reserve Manhattan Bank with its glittering stars and stripes logo or you will curse in frustration as yet another faceless machine informs you that your data is bad. You will begin to sense the network as very real, a vast jigsaw of numbers, names and details. **System 15000** is utterly absorbing and compelling and recalls the atmosphere of the BBC series *Bird of Prey*. Absolutely recommended.

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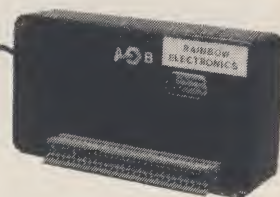
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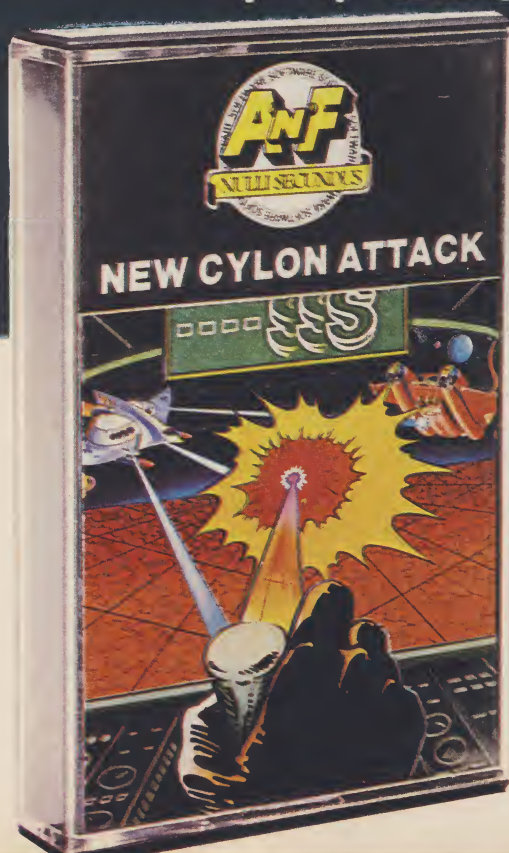
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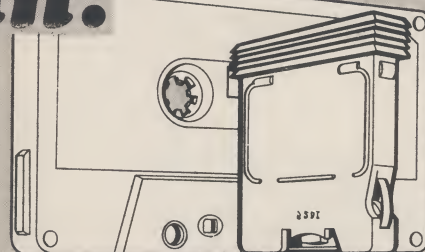
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Easy on Basics

THE REALLY Easy Guide To Home Computing, by Sue Beasley and Ruth Clark, adopts the discovery led method of learning. There are lots of cartoons and funnies interspersed throughout the text to aid the user, based on the characters of Mike and Rose and Inspector Key. Those characters at times can be a little overwhimsical which, in a way, detracts from the text.

It has to be asked, however, whether yet another book on learning Basic is necessary. Learning Basic at all is considered in some quarters to be inferior to learning Logo as a first programming language at nine plus. As *The Really Easy Guide to Home Computing* is aimed at that age-group, it would seem that it could be superfluous on two counts.

Theo Wood

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Case of the Pascal puzzle

THE INFLUX of different versions of Pascal for the Spectrum and QL has certainly made the language more popular with micro-computer enthusiasts and a good book on the subject is essential. Surprisingly enough, one of the best books was written two years ago and creates a novel approach to the language.

Elementary Pascal, by Henry Ledgard and Andrew Singer, may seem an uninspired title for a book but the sub-title, Teach Yourself Pascal by solving the mysteries of Sherlock Holmes, gives some clue as to the tack that the authors follow.

After a brief preface in which an old manuscript containing some forgotten notes, written by that eminent GP Dr Watson, are discovered, the book launches into the first escapade involving Sherlock Holmes. He discovers the Analytical Engine, which we would call a computer, and shows Watson how it can be used by a criminologist to

collate facts and render clues more helpful.

Holmes does not see it as a miracle machine which can solve cases but as something that will be useful in proving that his conclusions are correct. "Of most interest to me is that it will provide a way of expressing my logical methods in a rigorous form, and perhaps be useful in communicating to others my modest attempts at formulating a Science of Deduction".

Indeed it does. The explanations given by Holmes, followed by the notes of the authors, combine to produce an excellent, stimulating and amusing text which provides at least a basic grounding in the main Pascal sub-set common to all versions of the language.

The main section of the book is used by Watson to discuss four cases in which Holmes used the Analytical Engine. The first, Murder at the Metropolitan Club, deals with algorithms and shows how ideas for programs can

be written down in the systematic way required by the Pascal programming language. Holmes finds the murderer by fitting clues together within a computer environment and then looping around the program instructions until one clue fits with another and the villain is found.

The remaining cases build on the knowledge of Pascal that the first gives. In the Adventure of the Bathing Machine, Holmes enters data about sea tides in order to find the time of a murder and trap a murderer; A Study in Cigar Ash shows how Holmes teaches Watson how to enter data into the Analytical Engine using Pascal and how that information can be accessed; and finally, The Adventure of Clergyman Peter finds Holmes trapping a religious thief with the aid of a train time table and the Analytical Engine.

Once the main body of the Pascal language has been introduced Holmes indulges in a series of three pipe problems. Those are simple cases which show how useful application programs can be written in Pascal. The programs grow more complex but the real authors of the book continue the notes with which they back up all of Holmes' cases. Those notes seem to be for people who have not followed the famous detective's thinking.

Despite its unorthodox approach, *Elementary Pascal* should help even the most accident prone potential programmer learn the language which is growing more popular all the time. The book's style is somewhat similar to that of Conan Doyle and Holmes is a reasonable counterfeiter.

John Gilbert

Taking the QL to task

FEW PUBLISHERS have ever considered launching books about machine code on the QL or how to get the most from QDOS. While some have been capitalising on the power of the SuperBasic language others have just been worried whether the operating system will change or about how to treat the information.

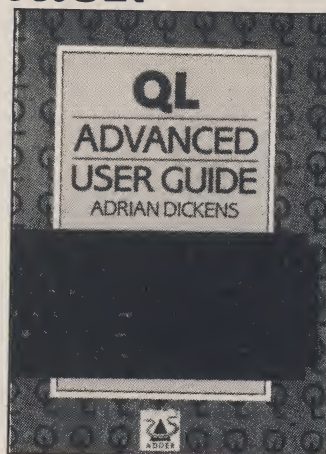
Neither of these worries has hit Adder Publishing which has just launched *The Advanced QL User Guide* by Adrian Dickens. It contains just about everything that both software houses and the private individual require to launch into machine code programming.

When taking the first steps towards QDOS mastery the reader is introduced to a

SuperBasic program called the Experimenter which will allow many of the 68008 registers to be changed. It also allows the beginner to see the results of QDOS routines, and how they will affect the running of the QL. Dickens suggests several experiments including suspending the operation of SuperBasic and printing a character on the screen.

The Experimenter is limited in its appeal but the author soon progresses into machine code manipulation of QDOS, giving a full list of QDOS utilities available and the traps required to invoke them.

Despite the sometimes convoluted style and the exorbitant price, *The Advanced QL User Guide* acts as an



excellent reference book as well as a tutorial. It is a stepping stone into the heart of the QL.

John Gilbert

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more books on page 133



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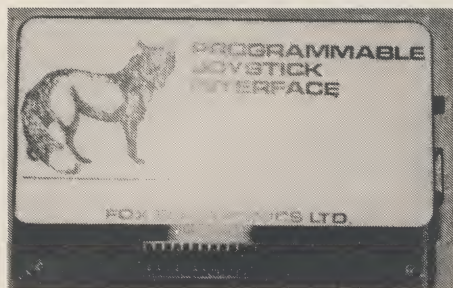
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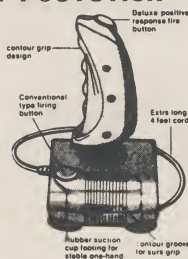
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Advice for hopeful software superstars

ANYONE caught giving away the trade secrets of an industry would normally be regarded with suspicion by co-workers in that field. The culprit in this case, A J Harding with his book *Writing Software For Profit*, is, however, likely to be blessed by colleagues in the software industry and amateur programmers who want to get their ideas into the shops.

The book, published by Virgin Books, not only shows how to approach the business side of the operation — going to software houses, writing specific application programs and dealing with income tax — but also describes the ideas

behind the industry, which types of programs are likely to be accepted and how to go about writing them.

The advice given is that of a software publisher as Harding knows the business inside out. He has been in it six years as director of a software house.

The first section of the book describes the industry, how it has grown and the type of people who are involved in it. It covers mostly the upper, business, end of the market but the innovations shown by Tandy and Commodore are equally true of the smaller outfits attached to the home market.

Harding explains that professional authors write for chips and not for specific machines. In that way one program can be adapted for a wide variety of micros which contain the same chip. For instance, a game written for the 6502 could be easily run on the BBC Micro and the Commodore range of machines. A Z80 game could be transported across a wide variety of machines including Spectrum and Colour Genie.

The next section, choosing a subject, expands on the theme of machine popularity. Harding lists the types of programs which companies will accept and stresses that

you should pick companies carefully.

Programs on the list include arcade, adventure, board, utility and simple account software. Each category has a section to itself in which the author explains the area and the pitfalls involved in it. He defines an adventure as a puzzle in which "certain actions have to be carried out in a chronological order". Harding goes on to explore some of the aspects which should be incorporated in adventures, such as syntax decoders, and how they have been used in famous programs such as those written by Scott Adams.

It is a change to find an author who talks about software writing as a business and not as an art form. His message is clear. Good software makes big bucks. Creativity is a consideration, but as in any other business money has to be a prime concern or you will be bankrupt before your first program has been accepted.

Harding's reasons for writing such a book, to help programmers get the most out of publishers when he runs such a company, might be regarded as suspect. The reverse is true, however, for two reasons. Publishers will welcome the book because it shows programmers what a company requires for a quick turnover of material. Gone will be the days of endless dross sent through the post on bad-quality tape or as listings.

For the programmer the book provides all the answers. It might deter some from writing software but those are likely to be the ones who demand attention for their masterpieces which are sent in as miles of computer printer listing. As the book says, computers mean business.

John Gilbert

No experience required

WHEN the QL sales finally take off there will no doubt be people buying the machine who have no previous experience with computers. For that reason the two books *QL Quill* and *QL Easel* are a comprehensive guide to their operation.

QL Quill was written by Clare Spottiswoode and Francesca Simon. The former has had a great deal of experience with both mainframes and micros. Francesca Simon, as arts journalist for the *Sunday Times*, has expertise in writing for a non-computerate audience.

It is that combination which is responsible for the jargon-free nature of the book, which takes you step by step through the operation of Quill, the word processing program for the QL. The book is well laid out with ample explanation of each new concept. Besides that each new task is tied in to the story of Harold and Joyce Blake, their daughter Miranda, and her besotted admirer Nigel Wooton. Cartoons,



from Derek Alder of the *Sunday Times* liven up the text. Whether you like or loath the family concerned, the tales of Harold, a soft toy manufacturer, and Joyce, setting up her jewellery business, provide adequate examples of the uses of Quill in a business.

The book not only teaches you how to use the program, but also contains a great deal of sound business advice. An example of that is Joyce's action plan for Jada Jewellery which contains all the necessary ingredients for preliminary action before starting a new trading venture.

One tiny quibble comes at

the beginning, when you are warned "Don't ever plug in a monitor when the computer is switched on, or you could blow your system." That is not in bold characters but lost in the text which preambles setting up the computer.

There is also an error in the instructions for Search and Replace. If you follow the book the procedure does not work; simply follow the screen instructions instead.

QL Easel, written by Alison Spottiswoode, who is as well qualified as her sister in the micro field, is written in a similar vein. There are more examples based on Harold and Joyce. The power of the program is readily accessible, and by illustrating that power the author has made it extremely easy for the business user to understand the usefulness of graphic interpretations of business figures.

Theo Wood

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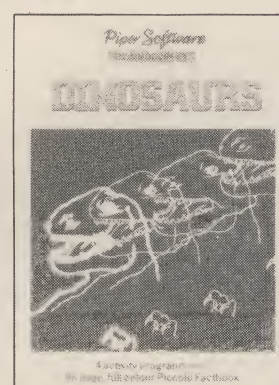
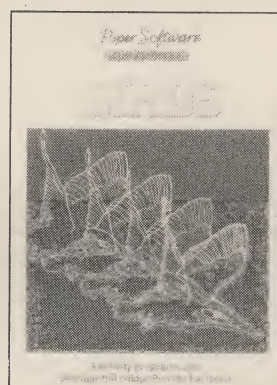
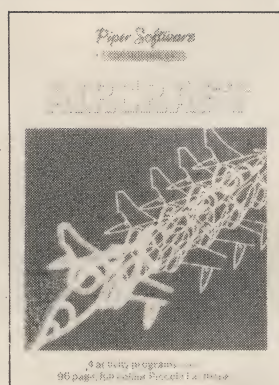
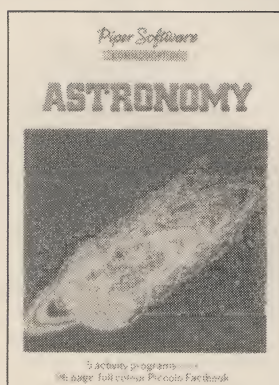
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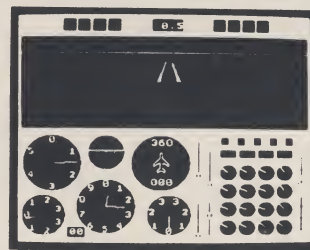
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Fools' gold from the funny farm?

Chris Bourne digs into the past of ZX-81 specialist, Julian Chappell

MAKING a living out of the ZX-81 seems an odd thing to attempt in times when most software houses treat the machine as if it were carrying typhoid bacteria. Some retailers would prefer to see a rabid dog on their premises than a ZX-81 game. But such has been the success of Julian Chappell's Software Farm that not only is the company a going concern but it is even planning to expand into new and bigger offices.

Julian was born in Hounslow of nomadic parents in 1956. "My father was an oil depot manager, so we kept

and did a control system for the local nuclear power station. Unfortunately we couldn't throw it into critical to test the system. I don't know whether they used it in the end."

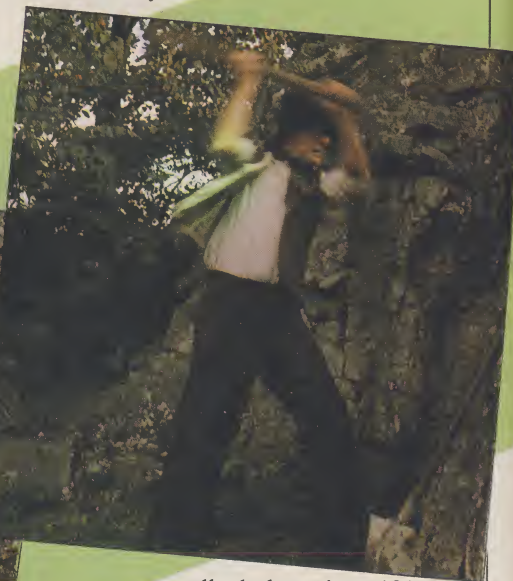
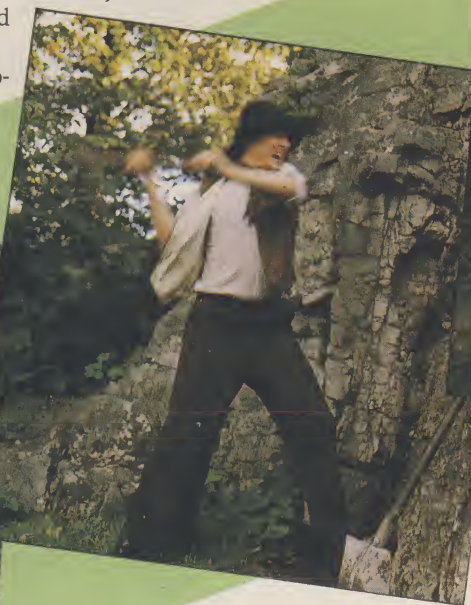
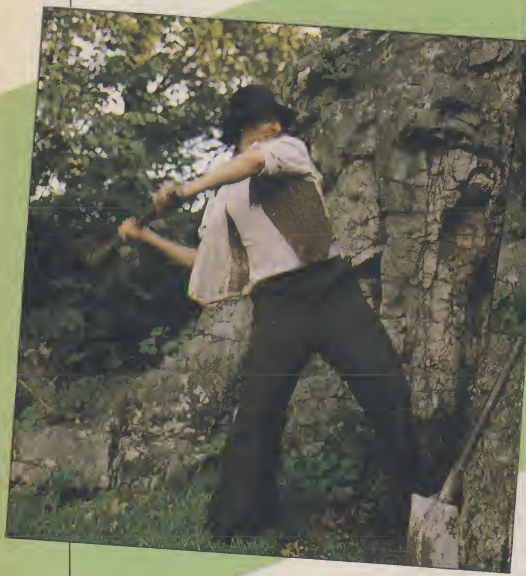
Before you heave a sigh of relief at the thought that nuclear devastation may after all not be under the control of the undoubtedly zany Julian, it is certainly true that a British Steel blast furnace is being monitored by bits of an old ZX-81, courtesy of the Chappell brothers.

"It provides a printout of the temperature," says Julian, "monitoring safety levels. Of course, it doesn't

crude as what I was doing myself at the time. Only nutcases had ZX-80s. When the '81 came out I thought I'd find out about this wonderful Basic language."

His first impression of wonderful Basic was that it was painfully slow, even when number-crunching. He wrote some games for it in code, a Pacman and Asteroids game, which were later marketed as **Asteroids** and **Gobblers**.

"I wrote them for fun. It was a busman's holiday really. Then I bought *Sinclair User* and saw that only about 10 per cent of the ads were for machine-code games. They



talked about it as if it was something amazing and mysterious. I realised that I might, as well jump on the bandwagon."

Together with his girlfriend Sarah Green, Julian took out a quarter-page ad in *Sinclair User* and began to sell his games. The two of them worked from a back bedroom, saving the games directly from the machine and doing the labels themselves. Sarah herself is far from being just a convenient envelope-licker, but a business programmer in her own right, having written for the Sirius, Apricot, "and IBM, yeuckk!"

"The response kept us up at night," Julian continues, "and we started making money. The problem, which still exists, was that the business side interferes with programming time."

Thus the Software Farm was born. Julian's parents had left the post office by now and had bought a small farm in South Wales, which became the business address, as Julian and Sarah were living in rented accommodation and

look like a ZX-81. We put it in a fancy box to make sure of that."

Machine-code expertise came haphazardly. "Paul would say, 'I've got this cheap chip we could bung in it' and half the time I had to hunt through the libraries for a list of mnemonics to program it. Sometimes there were only two registers and an accumulator."

Eventually the brothers fell out. "I wanted to do something on my own," Julian admits. "The business was unsteady, so I left him to go bust on his own. It was all very friendly."

Having drifted almost by chance into the world of micro-electronics, Julian had already acquired a ZX-81 of his own. "I was mildly interested in the ZX-80," he says, "but it was almost as

moving to new depots.

Eventually he retired to Weston-super-Mare and ran a sub-post office. I started work behind the counter when I was eighteen."

Julian had an older brother, Paul, who was an electronics graduate. Paul was setting up his own business constructing control devices for industrial processes. Julian was dragooned into learning machine-code programming in order to help write the routines to control the chips.

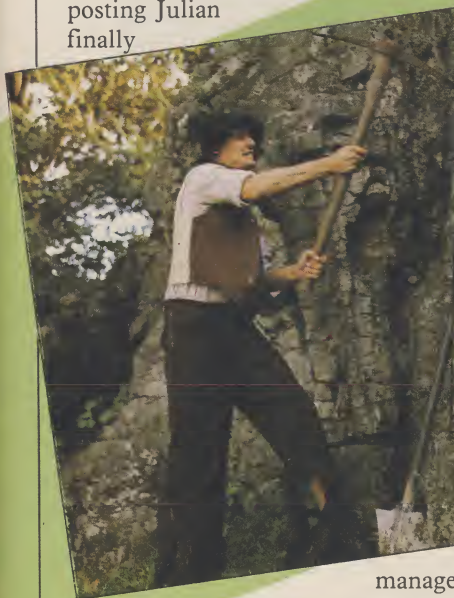
"Eventually we went high-falutin'

could not use it commercially.

"We were aware of the general attitude of fear towards computers, particularly among older people, so we thought calling the company a farm might help them relate to us. Originally we had a vegetable Pacman but eventually we decided on the cosmic cockerel."

In between long bouts of duplicating and letter-posting Julian finally

Eventually Software Farm decided what few software companies dared to consider: to remain with the ZX-81 in spite of the new machine.



Photographs — Mike McKnight

managed to write a new program, **Super-Scramble**. Instead of the usual missiles and neutron bombs Julian used bats and a witch at the end.

"It has very imaginative graphics even though they are not hi-res," interjects Sarah, supportively. The game was released for Christmas 1982 but the manual duplicating was becoming a major problem.

"At that time all the support agencies were in their infancy," says Julian, "but then we started getting information through the post. It was a godsend to us, even though it was still tape-to-tape. Only now, and only with big companies, can you get loop bin duplication systems."

Julian and Sarah took Super-Scramble to the very first ZX-Microfair just in time to see Spectrum fever hit the trade.

"We were deserted," says Julian. "We sold enough to break even, but it was a great disappointment. We made no trade contacts. Everyone wanted Spectrum games, and that has continued ever since."

Being left out in the cold did, however, give Julian a different perspective on what was happening. "We could see everybody was going bonkers. The software was all rubbish, with ten new companies a day. It was blatantly obvious that the market was flooded from day one."

"Although everyone was going stir-crazy, all those ZX-81s were not going to evaporate. We thought, let's do something clever and different with it. With any luck everybody else will leave us with the ZX-81 on our own."

For six months Software Farm lived off the dwindling profits from the original games, while Julian set himself to work out how to turn the ZX-81 screen into high resolution.

"It took six months to develop the system and three months to write the first program, **Forty Niner**. All the while the money was getting less. There was a sense of risk. If we had it wrong and the ZX-81s really were gathering dust then we would go bust."

The crunch came at the *Your Computer* Christmas Fair in 1983. At that time, the company was at rock-bottom. **Forty Niner** was launched, and took off. The gamble had worked.

Forty Niner was designed as a showpiece for the new graphics which give the same resolution as on the Spectrum. It is a digging game in which you must persuade the snakes to eat the giant rats or some such nonsense. Julian hit on the idea of projecting it as the first in a series of hi-res games, each one of which is to be on a distinct theme.

"It's like free wotsits in cornflakes packets," says Julian. "If you get one then you want the whole set."

The second game, **Rocket Man**, is a levels and ladders game in which you must collect diamonds while avoiding the man eating bubloid. If you get past

the third level you become a vulture and must eat legs of lamb to keep your strength up.

Selling the games to retailers was difficult.

"You could hear the voice at the other end of the phone drop as soon as they realised it was a ZX-81 game" says Julian. "We had to offer them sale or return terms, but once the media was on our side it changed. Now they keep badgering us for more."

The new game will be called **Z-Xtricator**, and will be of the **Defender** type. "It's not a vehicle for the graphics, otherwise we would have done it first. We are also going to do a hi-res utility so people can design their own games."

Z-Xtricator is not intended to be the last in the Software Farm hi-res series, but one thing you should not expect is any form of adventure game. Julian hates them.

"Normal adventures bore me to tears. You are in a dark hole. Something ferocious is approaching. Then you wait for twenty minutes while nothing happens . . . On the other hand, I have a hankering for a truly animated adventure, not a pretend one. If we did it, it would probably have to be on the Spectrum. The Software Farm," he adds, portentously, "being innovatory, will do it properly."

Sarah is anxious to dispel ideas that a Spectrum game would mean leaving the ZX-81. "Every letter we get says keep up the good work. We got one cute one which said the writer had written to *Jim'll Fix It* because he wanted to meet Julian."

Software Farm is certainly proud of its following. 'As long as consumers continue to buy the product we are not

continued on page 142



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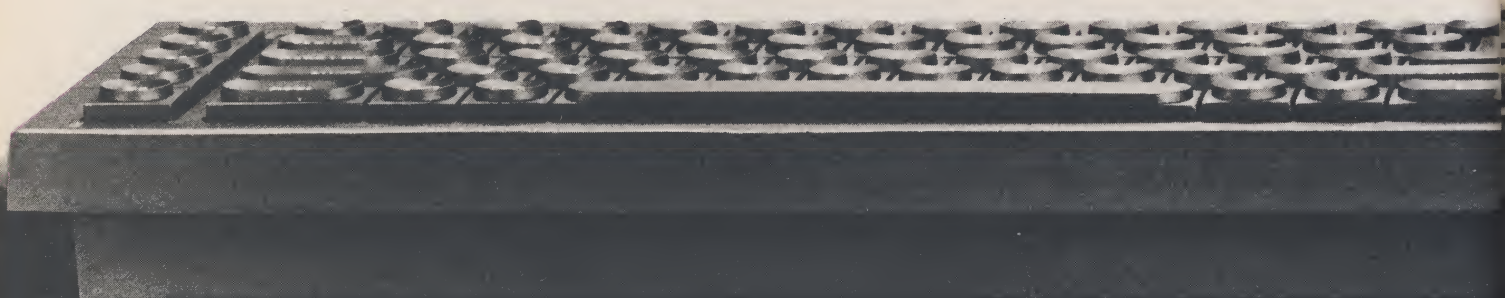
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Hit Squad

continued from page 139

going to drop the ZX-81," says Julian. "We'd get lynched if we did."

The company even runs a software club for enthusiasts with a regular newsletter containing letters, hints and tips, program listings and a series of articles by Julian on machine-code.

Perhaps it is the company's recognition of the importance of maintaining a loyal and friendly customer base which ensures its success more than anything else. Selling a ZX-81 game is quite a different proposition from selling for the Spectrum.

"All the support industries base prices on what the source industry can afford," says Julian, "which means Spectrum prices. A ZX-81 program has to be a hit or it won't make any money at all."

The problem is simply that although ZX-81 games tend to be cheaper than Spectrum games in the shops, because the ZX-81 itself is cheaper, the cassettes, labels, duplication and so on all cost just as much, so the profit margins are much lower. Unfortunately many of the enthusiastic programmers who send material to Software Farm do not realise that fact.

"Out of the thousands we are sent

lots are no good and many are just not commercial propositions", Julian explains. "The rest have ideas based on the Spectrum market. But you won't get £40,000 for a Spectrum game, yet they think they can make that on the ZX-81. A hit is vital, and even then it is not big money. Then they think they are being ripped off."

With the hi-res series of games, Julian and Sarah appear to have got the business about right. Rocket Man reached 28 in a Gallup survey of top games, which is extraordinary for a market dominated by the Spectrum and Commodore 64. But determination and nerve have been as much a factor in their success as excellence of programming or games design.

Perhaps a clue to Julian's character can be found in his hobby, an esoteric form of karate known as Tang Soo Do, which is concerned with demolishing opponents wearing full body armour—with your bare hands. "Our instructor is the World Champion of All Martial Arts" says Julian. Apparently the man has beaten judo, kung-fu, and karate experts into the ground with his skills. "If you turn up late for a class, you have to spar with him," Julian grimaces.

It certainly sounds like good prep-

aration for taking on the equally well-armoured hordes of Spectrum games producers, and winning shelf space and ratings up there with the best of them. One thing is for sure—there is no room for turkeys on Julian's farm



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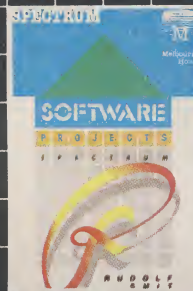
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The ultimate development from



Designed exclusively for the ZX Spectrum, Protocol 4 brings you game control customising in a way that no other interface does. It can accept all commercially standard joysticks, including the Quickshot II with 'rapid fire' or Trackball controllers, and is compatible with ALL Spectrum software. **OPERATES LIKE FIXED OPTION INTERFACES OR CAN BE FULLY HARDWARE PROGRAMMED**

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Utilising Hardware Programmed technology you have the benefit of automatic eight direction control, no power-down programming loss, guaranteed conflict-free operation with other peripherals, including microdrives, and no extra software to load or awkward joystick movements and key presses to make each

time you load another game. The keyboard remains fully operative at all times.

It is also perfectly possible to connect up to five Protocol 4's on one Spectrum, each programmed separately, for multiple player control — only possible with the hardware programmed design.

Incorporated into the design is a computer Reset button for clearing the computer memory between games without pulling the power plug out.

Fully guaranteed for 18 months, Protocol 4 comes supplied with five CustomCards, ten Quick Reference Programming Cards and complete instructions.



PROGRAMMABLE INTERFACE

As the first fully hardware programmed joystick interface, this product has become well established over the past year and will accept ALL standard joysticks or trackballs, including Quickshot II with 'rapid fire', for use with ALL Spectrum or ZX81 software — not just those with a joystick option.

- * No Software programming required.
- * Programming is *not* lost when power is disconnected between games.
- * Eight way movement — with or without the fire button pressed — only requires setting of the four normal directions.
- * Compatibility is guaranteed with ALL key reading techniques — machine code or BASIC.

* Several interfaces can be separately programmed and fitted to one computer for multiple player games.

Keyboard operation is totally unaffected by this interface, as with all AGF add-ons, and will never conflict with any other device fitted at the same time.

Twelve months guarantee, key programming information and a pack of Quick Reference Cards, to speed up setting of the clips, are supplied with full instructions.

INTERFACE II

The AGF Interface II represents the best low cost introduction to joystick control.

The 'AGF' control standard is now offered by over 100 games or utility programs for use with any joystick or trackball.

Any game which is controlled by the cursor movement keys (5,6,7,8) or has a Protek option is also compatible with Interface II.

A rear connector allows other peripherals to be connected at the same time.

This product is available for either the Spectrum or ZX81, is supplied with full instructions, a 12 month guarantee, and a 12½% discount voucher against further AGF mail-order purchases.

ROMSLOT

The new AGF RomSlot is designed for anyone who already owns a programmable joystick interface, or prefers to use the keyboard to control games, and would like to add the facility of ROM cartridge software to their system.

RomSlot will accept the Sinclair range of instant loading games and will also be compatible with the new releases from Parker Software — exciting new games only to be available in ROM format.

This system allows instant play. Your computer memory size is not important and you will be able to play games that could ordinarily require more RAM.

RomSlot incorporates an extra feature called 'Restart'. This allows you to instantly *restart* the ROM game.

RomSlot is guaranteed for 12 months and has a full width expansion connector to accept joystick interfaces, speech units and printers etc.

QUICKSHOT

The Quickshot joystick is an excellent value game controller incorporating suction cups for sure-footed precision with a comfortably contoured handle offering a convenient top firing button as well as one on the base.

QUICKSHOT II

Quickshot II has improved styling with a trigger type firing button as well as the top firing action, with a broader base for greater suction stability.

It also has a unique 'Auto-Fire' facility which at the flick of a switch provides a constant rapid firing action simulating a fast trigger finger.

	PRICE
AGF Protocol 4	£29.95+£1.00 p&p
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"Its price of £69.95 reflects the kind of use to which it will be put but it is certainly the top keyboard at the moment."

SINCLAIR USER JUNE 1984

Business Software

Business Bank Account £10.75

This program will enable you to enter debits under 17 different subheadings. Statements include totals of all subheadings.

Sales Day Book £10.75

For all your invoices, this program will enable you to prepare statements of outstanding invoices. Program will also calculate VAT.

Purchase Day Book £10.75

Keeps a complete record of all your purchases under 17 different subheadings. This program also calculates VAT.

Business Pack £25.00

Including all the above programs.

Stock Control £10.75

Handles 900 lines, including details of supplier. Program has full search facilities enabling you to search and update all lines from one supplier.

Invoicing £15.00

This program will print out invoices, calculates discounts and VAT. The program will calculate totals from unit prices. Up to 50 accounts with 250 outstanding invoices.

Word Processing by Tasman £13.90

Tasword Two is a powerful word processing program that will perform all the functions available on large processors. The program will give you 64 characters per line on screen.

Masterfile by Campbell Systems £15.00

This is one of the best database programs available for the ZX Spectrum. This program has many uses in a small business.

Dlan by Campbell Systems £7.95

Use your Spectrum to sell your products. Dlan will display messages in up to 11 different typefaces. Will scroll text in any direction.

64 Column Generator by Tasman £5.50

You can use this program within your other programs to display 64 columns on screen.

Payroll by Byte One £19.95

This payroll program will handle up to 40 employees and will calculate NIC, PAYE, superannuation and many other deductions. This is a very user friendly program and extremely good value.

NEW

Sales/Purchase Ledger Invoicing £25.00

This program is for use on micro-drive only. The program will print an invoice using a built-in price list and post the invoice to your customer's account. Will also print price lists, statements, labels etc.

Tasmerge £10.95

Allows you to transfer data from Masterfile into Tasword enabling you to use Tasword for mail merge. The program allows you to specify line and column of each field. For use on micro-drive only.

Superfile £14.95

This is a new database program that stores pages of text 64 columns x 22 rows. The program includes word processing and full search facilities.

Omnicalc 2 £14.95

This is the long-awaited micro-drive version of omnicalc complete with histograms and many other features.

Projector 1 £13.90

Business graphics program that will help you present your cashflow, sales expenditure in many different ways including pie line, and histogram charts.

Tasprint £9.90

Use this program with Tasword Two to produce 5 different fonts on a dot matrix printer.

MF-Print £6.95

Enables you to set a print format for your full-size printer within masterfile. Supplied complete with masterfile for £19.95.

Trans Express £9.95

Micro-drive utility program which will enable you to backup all your micro-drive cartridges.

Now in stock

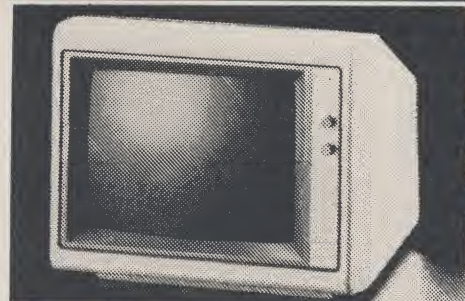
Blank micro-drive cartridges £4.95
Continuous paper £12.99
Printer ribbons from £3.50

QL

Centronics Interface £39.95
QL Dust Cover £5.00

Transform can supply a wide range of printers, monitors, and leads for the QL. For further details send S.A.E.

Monitors



It is possible to connect your Spectrum to both Black/Green and composite Video monitors using high resolution monitors are particularly useful with programs like Tasword that use 64 columns. We supply complete instructions on how to connect monitors to both Issue Two and Issue Three Spectrums. These monitors can also be connected to your QL.

Phillips black and green £75.00
Kaga/Taxan black and green £99.95
Sanyo Med res for QL £273.60

Printers

All the software we supply runs on full-size printers (unless you are using interface 1) you will require an interface to connect your Spectrum to a printer, the interface we supply uses the graphics characters to set printer codes as in Tasword and prints a double size screen dump.

Centronics/RS232 Interface £45.00

Dot matrix printers

Brother HR5 £132.00
Brother M1009 £163.00
Star Gemini 10x £199.00
Epson RX80 FT £229.00
Epson FX80 £324.00

Daisywheel printers

Smith-Corona TP I £189.00
Silver Reed EXP500 £284.00
Brother HR15 £349.44

Please add £5.00 delivery plus VAT to the price of printers and monitors. All software prices include VAT, post and packing.



TRANSFORM LTD. (Dept. SU) 01-658-6350
41, Keats House, Porchester Mead, Beckenham, Kent.



Contents

More from our postbag below, and on page 150 Mike Wright takes a look at new improved versions of old software.

SINCLAIR BUSINESS USER

January 1985

Excommunicated!

I TENDED to feel, at first, that Mr Simmonds — October — was a little harsh when speaking of **Vu-Calc**. In practice, however, the program is little more than an unmitigated disaster.

The program can be difficult to load, often will not respond to commands, frequently crashes and inevitably loses all one's hard won data.

I use the program in connection with the local church accounts and I dare not lose any more data or the Vicar will excommunicate me.

For my part, the theoretical facilities are adequate but the appalling unreliability and continual loss of data even in a simple spread-sheet have rendered the program unusable and caused me a lot of embarrassment. It is far safer to do things the old, hard way by hand and, strangely, it is much faster.

Can anyone tell me is Omicalc is any more reliable? I don't care about extra facilities.

W L Simpson,
Wimborne,
Dorset.

Proportional spacing

REFERRING to your answer to Charles Lane, *Sinclair Business User* November 1984, as I understand it the term 'proportional spacing' has now come to mean one of two things: (i) words can be

moved to square up lines of text so that there are equal gaps measured in units of less than one character space; (ii) it is possible to specify exactly how much space is to appear between each letter i.e. an 'm' will take more space than an 'i'.

I have been using a Juki 6100 Daisywheel printer, with **Tasword 2** as the word processor program. That printer supports proportional spacing of type (ii) above. I wish to print, as Mr Lane, justified right hand edge proportional print — to look the same in your magazine — but as yet I have not found any program which will do it using the Spectrum.

Dr R M Megit,
Hastings, Sussex.

Transform warning

FIRST, congratulations on an ever-improving magazine. Looking over back issues it certainly would appear that your editorial staff do take note of valid criticism — and the result is less trivia, more interest, in your letters pages.

Next, a warning to potential purchasers of the professional keyboard from Transform. I recently ordered one. It didn't work at all. To the company's credit they sent a replacement PCB and connectors by return.

However, having tested the keyboard for response, I then assembled it; loading

from tape was all right but programs crashed on running, the UDGs were corrupted, and other lines.

Microdrive loading was even worse. Apart from program corruption, the machine commands — SAVE and MERGE — were interfered with, and the microdrive would not stop.

Transform is obviously aware of those problems, as enclosed with the keyboard is a letter admitting that, offering an add-on buffer at £6.95.

If the problem is so well

known, why isn't the original board modified to include the buffer?

L S Delby, Shefford,
Bedfordshire.

Software in the toolroom

I OWN a 48K Spectrum, and I wish to know if there is a software house which produces a program on the skills of carpentry and joinery.

J Mitchell,
9 Clive Avenue,
Crayford, Kent.

Shop Window

SHOP WINDOW enables you to publish details of programs with limited markets once only in Sinclair Business User, at no charge. If readers would like details to appear regularly they can advertise in Sinclair Supermart.

Mozart. Three 48K programs giving details of the Köchel catalogue of Mozart's music. Program 1) deals with the complete catalogue, and programs 2) and 3) with instrumental and vocal music respectively. Each costs £5 from John Halsall, 18 St Michael's Close, Exeter EX2 8XH.

Cub Pack Record. A record system for Cub Scout Leaders, with analyses, promotion and proficiency tables. 48K Spectrum. Roger Missing, 16 Kedleston Drive, Orpington, Kent BR5 2DR. Price £5.

Hair Defenders. Program 1 deals with knowledge of hairdressing, programs 2 and 3 with scientific aspects of hair care. 48K or 16K. John Lyons, 6 Queens Road, Camberley, Surrey, GU15 3AN. £5.75 or £15.00 the set.

Organic Chemistry. Draws ring-containing structural formulae, from simple compounds to steroids and antibiotics. Handles heteroatoms, stereochemistry, bond types, and substituent groups. 48K. M Davis, Dept of Chemistry, La Trobe University, Bundoora, Vic, Australia 3083.

Survey II. Analyses questionnaire data. Generates full frequency distributions, histograms, cross tabulations, chi-square statistics. 48K Spectrum, from Lobos Software, 10 Randall Place, Bradford BD9 4AE. Price £10.00.

Curtain Estimator and Receipt Printer. 16/48K. Calculates all curtain requirements from bare window measurements, and prints a receipt of details. Plushscale Ltd, 14-16 Little Walk, Harlow, Essex CM20 1HY. £24.99.

Track down share-outs

Mike Wright finds how to keep stock of your shares

AT THE TIME of writing a major advertising campaign is being run to persuade as many ordinary people — in other words, you and I — as possible to buy British Telecom shares and so start dabbling in the stock market. For those of you who have got your feet wet in the sea of shares ownership **VA£TRACK 2** from Morley Davies Associates may be of some interest.

It is a share portfolio management system for use by chartists — those who believe that share price movements reflect the relevant information and that the analysis of those movements leads to correct decisions on buying and selling. The original version was developed for the ZX-81 but was never made commercially available.

VA£TRACK 2 is supplied with a 22-page manual which tries to explain not only how to use the program but also something of the philosophy of buying and selling shares. It is one of the best written and easiest to read you are likely to come across. The program is recorded on both sides of the cassette with a file of dummy records also recorded on the first side. It is loaded using the command CLEAR 64500: LOAD “ ”.

The basis of VA£TRACK 2 is a list of weekly share or index prices over the last half year and that your portfolio comprises shares from some of those. Share values should be updated weekly from the Saturday edition of the *Financial Times* and that copies of the last 26 weeks' issues are kept in case you need to add data for other shares. Alternatively, Morley Davies will supply additional history tapes which give 26 weeks' prices for specified shares.

The program has facilities for listing the records to the screen or printer, adding new records either manually or from additional history tapes, doing a weekly or an interim update of share prices, valuing your portfolio as well as loading and saving files. Options are also available for generating test records

or examining the postures, or trends, of all or part of the records.

Five postures are used based on comparisons of the five and thirteen week moving averages and last week's price. The large amount of calculation necessary for posture tracking makes the process painfully slow. The manual recommends that you make a cup of coffee after selecting this option but a three course meal may be nearer the mark for a large number of records.

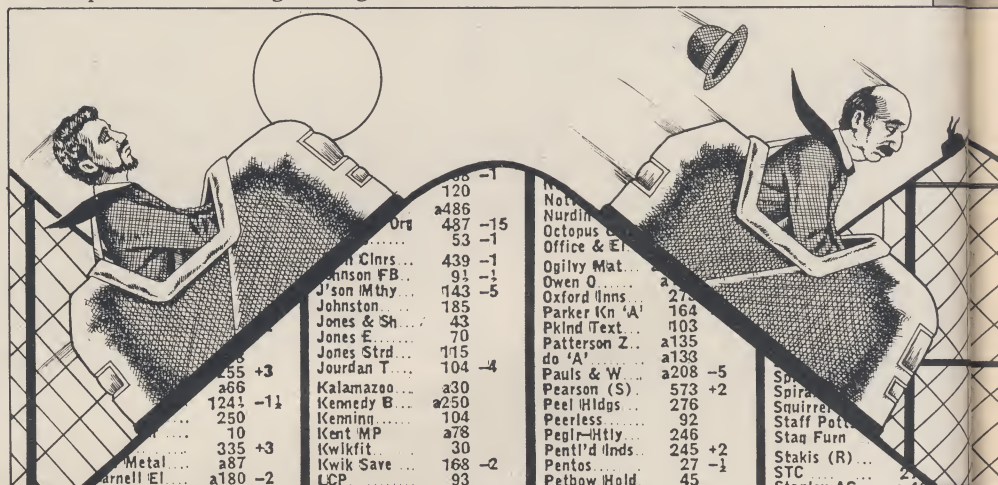
Individual records can be put under the microscope by selecting option 0 from the main menu. After entering the record number a subsidiary ten option menu is provided that lets you analyse the last 13 weeks' data in either raw (unadjusted) or adjusted (price changes are smoothed by reducing all movements to less than 10 per cent) form. In both cases five and 13 week arithmetic and exponential moving averages are

you with horror (aren't computers supposed to save time?). However it is difficult to see how those operations can be shortened unless it is by the use of an optical character reader or modem and bulletin board.

The posture tracking takes an age to complete but to say it is slow does not take into account the large number of calculations involved or the time it would take to do it by hand.

One very pleasant surprise was the way in which you are protected from yourself. Selecting an option from a menu requires only one key stroke and invalid options are ignored. Typing errors which in most programs would be fatal, such as entering characters when the program is expecting numbers, either result in being asked to input again or jumping to the date screen at the start of the program. It would be nice if some of the larger software houses paid the same attention to detail.

VA£TRACK 2 is most definitely for use by the dedicated stock exchange dabbler — others are likely to find the amount of work necessary to get a return an inconvenience. If you are considering it then remember it is only a tool — the interpretation of results and the decisions made on them are



displayed together with the posture and the slope of the last five weeks' prices. A range of graphs showing the raw or adjusted data, the slope or a comparison with another share or index, can also be produced.

Reading the manual makes you very aware of the time and effort involved in using VA£TRACK 2. The suggestion of keeping 26 weeks' copies of the *Financial Times* is frightening (aren't computers supposed to cut down paperwork?), and the thought of spending an hour and a quarter entering details of a mere 20 shares or even fifty minutes on a weekly update of 200 shares may fill

yours alone.

Morley Davies say that VA£TRACK 3 should be available on microdrive or cassette and will apparently be cheaper. It will also feature more analysis and will cope with selling shares not owned. In order to include the extra features the maximum file size will be reduced from 200 records.

Morley Davies Associates, 11 Denham Lane, Chalfont St Peter, Bucks SL9 0ER

VA£TRACK 2
Memory: 48K
Price: £48.75
Gilbert Factor: 7

Something old, something new

A survey of extras

UNLIKE GAMES software which, in general, achieves volume sales rapidly before virtually disappearing, applications software tends to sell steadily and have a much longer life. Many applications programs are developed and improved during their life. With the *Sinclair Business User* section just over a year old it is a good time to look at the updates to some of the programs we have reviewed.

The very first review in December 1983 was of the OCP **Finance Manager** for the 48K Spectrum. That has been upgraded to include microdrive compatibility, allowing both the program and data to be saved separately to face. That set up routine is only used when loading from the original tape.

Saving the program — to tape or microdrive — also saves the printer interface codes to give a personalised

version for subsequent use. The print-out for the +80 version shows the date of transaction, the account, the details, separate columns for debit and credit and the balance. That compares with the date, account, amount and balance on the ordinary version.

OCP has upgraded its other programs in the same way. According to Francis Ainley the good news for QL owners is that he is working on an enhanced program allowing a class heading, in addition to the account and description, to be used with the transaction. The program is likely to feature some sort of windowing.

Upgrading to microdrive compatibility was not possible with the Transform **Sales/Purchase Ledger/Invoicing** package as it was designed to run using twin microdrives anyway. Instead, improvements have been made to the Accounting program. Previously it was only possible to produce an overall total figure for all, or some, of the accounts by loading each account separately, noting totals and adding them up. Now a series of extra menus allows the list of accounts to be displayed and any combination of those to be selected and totalled. Accounts can be erased from a cartridge as another option. The package was reviewed in the November issue.

The **Kemp Stock Control** program was reviewed in the August issue and version 3.0 has been released recently. Like any other programs which have been improved Stock Control is now microdrive compatible but the improvements do not end there. It now has the option of selecting a full-sized printer and a 64-column printout.

If a full-sized printer is to be used and your printer interface needs software to drive the printer then that must be loaded each time before the program. The option of a full-sized printer must also be made every time. Although the resulting printouts are more widely spaced they are no more informative than those on the ZX printer.

Other improvements include making the length of the stock numbers and descriptions user definable. The stock number can be up to ten characters long while the stock description, previously

20 characters, can now be set at any length between 4 and 30 characters. Of course, the more characters used for those fields the less room there will be for the records.

Another improvement now allows up to two decimal places to be used for stock quantities. With those improvements this is now the most flexible stock control program available on the Spectrum.

It is difficult to imagine many improvements which could be made to **Tasword II**, the word processing program from Tasman Software. Instead, Tasman has released its equivalent of Wordstar's Mailmerge program called **Tasmerge**. The program is designed to operate with Tasword II and the Campbell Systems **Masterfile** and allows you to insert names and addresses from a Masterfile database into a standard document produced using Tasword II.

Now that it has a mailmerge facility Tasword II is once again streets ahead of its nearest rival, although the Softek word processor for the Wafadrive will be a strong contender if rumours of a database and a mailmerge facility are true. With Tasword II and Masterfile included as part of the microdrive/interface 1 Expansion Pack Tasmerge has a whole new market.

Speaking of Masterfile, that has been improved since it was reviewed last February. The latest version — version nine — comes in a smart plastic case and now includes MF Print which allows Masterfile to print to full-sized printers. That is done by allowing the user to set up and save the outline report exactly as it is to be printed. The blank report must then be loaded before printing out the selected records.

Unlike the ordinary report formats for the ZX printer only one report can be held in memory at one time. Others must be loaded when needed. In addition numeric data can be printed in a variety of formats including integer, two decimal places, with commas showing thousands and prefixing any character such as a currency sign. With those improvements the best database for the Spectrum is now even better.

Mike Wright

Campbell Systems, 15 Rous Road, Buckhurst Hill, Essex IG9 6BL.
Kemp Ltd, 43 Muswell Hill, London N10 3PN.

OCP Ltd, 4 High Street, Chalfont St Peter, Buckinghamshire SL9 9QB.

Tasman Software, Springfield House, Hyde Terrace, Leeds LS2 9LN.

Transform Ltd 41 Keats House, Porchester Mead, Beckenham, Kent.



the program the option of cataloguing a cartridge is not included.

The +80 version of the program, for use with full-sized printers, has had a further refinement added. Previously the program could only be used if you had the Kempston Centronics interface, now it has been programmed to offer a choice of 15 different interfaces — ten Centronics and five RS232 — or to set up the codes for any other printer interface microdrive attached. The program is supplied on cassette and still includes a facility for saving to tape. Although the program can now be run from microdrive and data files loaded within

software that's hard to beat...

48K
SPECTRUM

TASWORD TWO

The Word Processor ★

"If you have been looking for a word processor, then look no further."

CRASH June 1984

"The number of on-screen prompts, together with the excellent manual, make it ideal - even for an absolute beginner."

PERSONAL COMPUTER WORLD

September 1983

"Without doubt, the best utility I have reviewed for the Spectrum."

HOME COMPUTING WEEKLY

April 1984

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The Mail Merger

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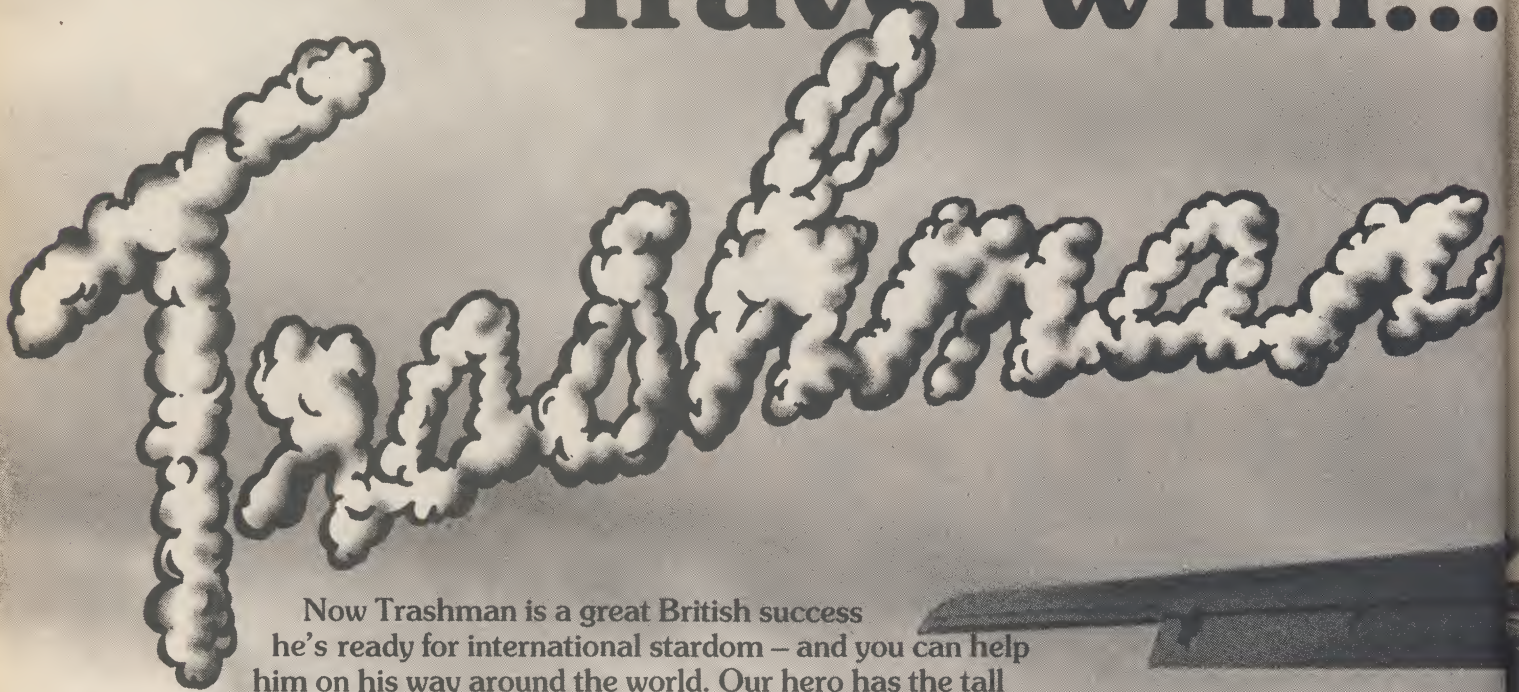
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Of course, your skill can help our hilarious hero to complete the necessary litter collection at every location, so he can earn the money to fly on to the next country in his round the world quest. And as he visits every continent on Earth in search of rubbish you can share every fun filled, thrill packed second with him.

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TRAVEL WITH TRASHMAN. AUTHOR – MALCOLM EVANS

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Pat on back for Longman

Theodora Wood assesses a new range of software

WITH THE plethora of learning programs available for use in the home, it is difficult for the prospective buyer to sort the wheat from the chaff. Comparisons are odious, but can be very useful as a guide. The recently released range of programs from Longman can serve as a yardstick to measure the value of some offerings in this field. The Longman Group having published educational texts for many years brings a wealth of experience to software publishing.

Software aimed at the under-11 age group, has to provide a certain degree of entertainment. Programs with a major undisguised element of sustained skill learning are unlikely to be popular with children at home.

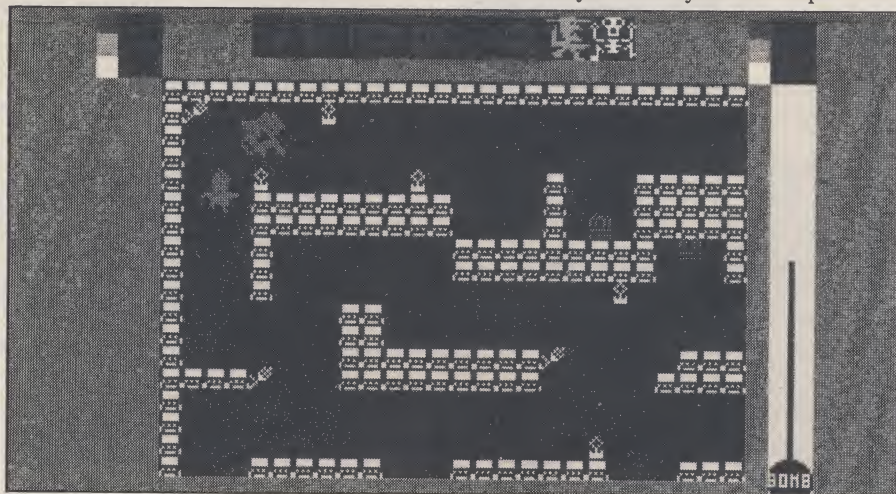
The Mr T range of programs from Ebury software, under the *Good Housekeeping* label, was a minor breakthrough in early learning. The programs covered numbers, shapes, measuring and the alphabet, all superbly presented in the form of games designed to appeal to the pre-school age group. They provided good graphics and an educational strategy which would not be out of place in a primary school. New titles include **Mr T in the Mystery Maze**, which shows a move towards problem-solving skills for seven plus.

The Longman range for that age group includes **Hot Dog Spotter**, **ABC . . . Lift Off** and **Countabout**. Those are standard programs which feature arcade routines as part of the action and have proved just as popular as the Mr T programs. The new Longman program, **Postman Pat's Trail Game**, based on the books and TV series, encourages thinking and memory skills as well as the use of the cursor

time at the more difficult levels. For a four-year-old Postman Pat Rules!

SuperTed is a similar program, except that this time our hero has to try and catch the villains and put them in jail before a bomb goes off. Quite delightful. A format of nine mazes is the playing area and the positions of the villains are shown on a small grid at the top of the screen. Speed and accuracy of movement round the playing areas require care, though the speed is rather too slow. It would have been useful to have a selection of playing speeds. Both programs benefit from joystick control.

Longman's middle range of programs for the 7-11 age group has nothing in particular to recommend it. That is not to say that the programs are not good, but merely that they are on a par with



SuperTed

keys. Postman Pat — such an inoffensive character — has to follow the trails left by various characters in the story clutching a letter or parcel. He then has to find his way back to the Post Office without help from the tracks. Greendale is pictured on the screen complete with sheep, hedges and bridges, as well as cows which block the road from time to

others. **Robot Runner**, a tables tester, **Wild Words**, a spelling tester, and **Sum Scruncher** all bear the Longman stamp of drill mixed with arcade routines. Numerous other companies provide similar programs, notably Mirrorsoft's **Quickthinking**, Sinclair's **Castle Spellerous**, and Stell Software's **Maths Invaders**.

Other new titles for the Spectrum from Longman feature programs aimed at the family, capable of supporting up to four players. In **Riddle of the Sphinx** you have to build up words on one face of a pyramid, always starting with the letter that finished the previous word. **Word Wizard** asks the players to make anagrams out of a specified number of letters. To play **Snaffle** you have to use letters as they appear on the board and build a word out of them, as well as snaffle an opponent's word to make a new combination. If a word is not in the dictionary the players can verify that such a word exists. Snaffle is the most interesting game but also the most expensive of the three.



Postman Pat's Trail Game

continued on page 159

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continued from page 157

A new company, Hill McGibbon, is set to be a rival to Longman for this age group. Formed by three ex-Heinemann people it brings long-standing experience in publishing to the field of software development. Hill McGibbon policy is to produce games of high entertainment quality in themselves, but which have an underlying educational content. New games for the Spectrum include **Run, Rabbit Run**, a board game with strategic possibilities and **Friend or Foe** which is similar, both priced reasonably. The catchphrase, 'games to stretch the mind' could set the tone for software in the future.

Longman, however, has in **First Moves** a program to teach chess for eight-year-olds upwards. Chess is surely the greatest strategy game of all time, and any program which smooths the way to understanding of the complex nature of the game must be useful. The program concentrates on the chess pieces and their moves, and comes complete with a full colour poster for handy reference.

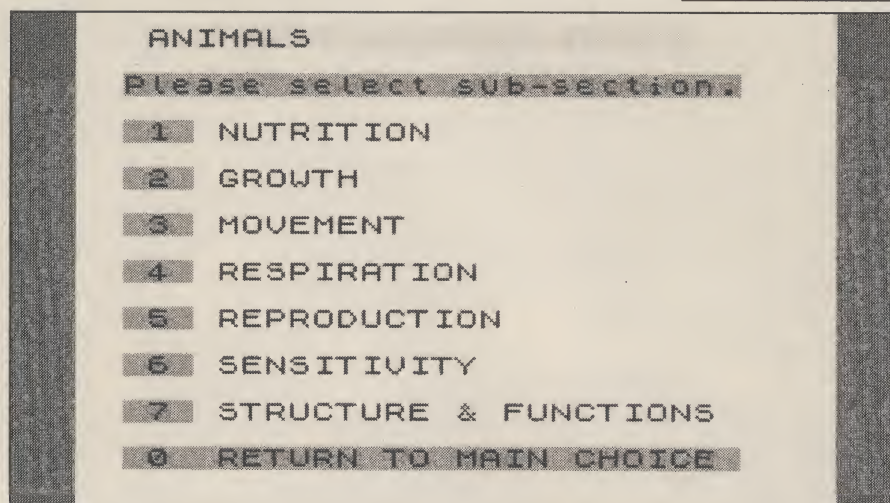
A joystick is a great aid to moving the pieces, otherwise rather a complex manipulation of the numbers one to eight is required.

The main disadvantage is that the screen board is tiring on the eyes. Longman does not help by using green and magenta for the board colours, and even with the colour turned down there is a certain amount of drift.

The program takes the user through all the moves of the pieces before starting any games, although you can go straight to the games if you wish. The games start with few pieces: level one is the King and his castle, going on to an almost complete game in level six using one of all the pieces with accompanying pawns. A Help key is available to show where each piece can be moved when it is the player's turn.

Self study is becoming a topic of serious consideration for schools, providing the chance for a student to learn at his/her own pace, and Longman is uniquely placed for this. The revision package **French O** level and CSE has to be considered the best of its type.

Chalksoft's **Eiffel Tower** is a French vocabulary tester providing 20 word lists in two programs for £9.25. The Longman program has 29 word lists in two programs which have comprehensive testing facilities. Sulis Software has produced a package to revise French irregular verbs, at £9.95. The Longman



Kingdom

package contains a program which enables the student to revise the same.

As well as those two facilities the Longman program has a composition tester, where the user has to remember a short piece of French prose and then ENTER it, and a map-based program highlighting the regions and towns of France. The price is £7.95, which must be considered a good buy under the circumstances.

The revision program **Biology** shows a similar range of activities. There are five programs. **Text** carries nearly 400 references over the subject, and the student is advised to make a note of those on his/her syllabus, and pay particular attention to those marked with a star. **Skeleton** is a word game which asks questions and builds up a picture of a skeleton with labels.

Heredity covers just that, but in an interactive way. It tests knowledge of the principles of heredity by asking the student to forecast the outcome of a particular mating in the form of a percentage. You are also able to set up breeding combinations and see what happens. **Kingdom** is an exploration of the main types of creatures and plants.

A specimen or example can be identified by its characteristics.

It is also possible to compare the different types of life form. This is an excellent way of coming to grips with all those long Latin names as well as gaining an overview of the main classifications used.

Food covers the major components of nutrition and tests knowledge of the same.

Both the French and Biology packages appeal within their limitations, and represent reasonable value for money; they also help with revision strategy and organisation of time by pinpointing areas of the subjects concerned with precision.

Overall, the Longman range for the Spectrum seems particularly strong in the rule and drill and revision departments but lacks a variety of strategy, problem-solving games and adventures. First Moves excepted. That is probably a result of the company's involvement in educational texts which leads it to concentrate on those formats rather than enter what might perhaps be considered a more creative use of the Spectrum.

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Chess II	Artec	9.95	8.95	Design	Design	7.50	6.75	Interceptor	Imagine	5.50	4.95	Microsphere	5.95	5.35	5.35
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Eye of Ban	Artec	9.95	8.95	Design	Design	7.50	6.75	Interceptor	Imagine	5.50	4.95	Microsphere	5.95	5.35	5.35
Fortis	Artec	14.95	12.00	Design	Design	7.50	6.75	Interceptor	Imagine	5.50	4.95	Microsphere	5.95	5.35	5.35
Golden Apple	Artec	8.95	8.25	Design	Design	7.50	6.75	Interceptor	Imagine	5.50	4.95	Microsphere	5.95	5.35	5.35
Invasions	Artec	4.95	4.50	Design	Design	7.50	6.75	Interceptor	Imagine	5.50	4.95	Microsphere	5.95	5.35	5.35
Mr Wong	Artec	6.95	6.25	Design	Design	7.50	6.75	Interceptor	Imagine	5.50	4.95	Microsphere	5.95	5.35	5.35
Loopy Land	Artec	6.95	6.25	Design	Design	7.50	6.75	Interceptor	Imagine	5.50	4.95	Microsphere	5.95	5.35	5.35
Smooch	Artec	5.95	5.35	Design	Design	7.50	6.75	Interceptor	Imagine	5.50	4.95	Microsphere	5.95	5.35	5.35
World Cup Soccer	Artec	6.95	6.25	Design	Design	7.50	6.75	Interceptor	Imagine	5.50	4.95	Microsphere	5.95	5.35	5.35
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Borak	Cambridge	7.95	7.15	Design	Design	7.50	6.75	Interceptor	Imagine	5.50	4.95	Microsphere	5.95	5.35	5.35
Bea George	Cambridge	6.95	6.25	Design	Design	7.50	6.75	Interceptor	Imagine	5.50	4.95	Microsphere	5.95	5.35	5.35
Rock Buster	Cambridge	5.95	5.35	Design	Design	7.50	6.75	Interceptor	Imagine	5.50	4.95	Microsphere	5.95	5.35	5.35
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"The appearance of a new program from Level 9 is a flag-day for all aspiring adventures and, in my household, a signal for the cat to hide under the bed for the duration against the inevitable moment when I go rampaging through the flat, a wild look in my eyes muttering ferociously about bricklaying birds nudist beaches and the like. Since *Return to Eden*, the sequel to *Snowball* is out, the cat may be in hiding until Christmas.

You don't need to have played *Snowball* to get into the sequel as ever, there is ample documentation with the tape which in my Commodore 64 version (it is also on the Spectrum, Amstrad and BBC), is turbo-loaded. It starts with you, agent Kim Kimberly, having been framed for sabotaging the colonyship *Snowball*, in a crashed stratoglider on the planet Eden. For the moment your mission is to survive the misplaced retribution by your own people, but life gets very much more complicated than that. Solving these puzzles has nothing to do with luck, you either figure your way out of trouble on Eden or die there. One major difference between

this and former Level 9 efforts is that the Spectrum and C64 versions have graphics of a very high quality and can be switched off if required. The scope of the vocabulary appears unscathed by this addition.

Even experienced adventurers will probably get fried a few times by the avenging engines of the *Snowball*, before discovering how to take shelter. But, once that hurdle is passed the real adventure begins, and it's a lulu.

From the radioactive desert caused by the engine blast, you progress through a variety of hazards through some highly unlikely locations.

I haven't got to that point yet, and so far superhuman willpower has stopped me using the clue sheet

provided, but I can't hold out very much longer

since I am having what could be lethal communication problems with some robots

Terrific fun, but should carry a mental health warning

Popular Computing Weekly

7 Nov

8

Return to Eden



Level 9 Computing

Snowball



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FOR ANYONE who wishes to use a Spectrum for other purposes than playing games there is a wealth of literature aimed at teaching the Basic language. Many who have mastered aspects of that find themselves directed towards writing games programs rather than more serious applications. The main reason for that is the lack of direction in the literature towards developing business or educational type programs.

We can, however develop a technique for writing non-games type programs which is both simple in concept and in widespread use already. The resulting programs come under the general category of Menu Driven Programs.

Many who have decided to delve into the Basic language quickly become disillusioned because of its apparent unstructured nature. That means the majority of programs are difficult to break down into definite sections. They are like a book with only one paragraph covering several pages.

It is possible to write a program in Basic as a series of sections each of which can be RUN as a separate program without necessarily relying on all the other sections. That is exactly how a menu driven program is constructed, with the menu section forming the skeleton from which other sections are accessed. Many commercial programs for large computers are menu driven as the operators are not programmers. From the programmer's point of view the advantages of having separate sections

Alan Pratt cooks up a method of organising program structure

MenuMaster

new: detects if a character has been drawn or loaded from tape 0=no, 1=yes.

a=0, b=1, e=7: those frequently used numbers are stored in variables which are then used in place of the numbers to save memory.

menu=200 (defines the line number 200). **n\$(10)** contains the name of the character (used in LOAD/SAVE to tape).

w\$ is a frequently used comment.

e\$(13) used to blank out 13 characters on the screen.

d(8) used in the binary conversion loop.

c(24,4) holds the numeric values of each byte in the character.

a(24,32) holds the contents of the full screen 1=filled in square, 0=empty square,

i, j, k, m are temporary variables.

j\$ is a temporary string.

t and **t\$** are used in 'Fill a\$(i)' to reconstruct the full screen display from the numbers in c().

r and **c** are used to define the pen tip on the screen as row and column numbers.

r1 and **c1** are temporary values of **r** and **c**.

p determines if the pen is to rubout or draw: -1=rubout, 1=draw.

q and **w** are used to detect which of the cursor keys are being pressed. These are read using IN statements.

Table 1. Variable list for Program 1.

is that each can be made error free before the next is written.

The main section containing the menu displays a set of options available

to the user with some means of selecting between them. That can take various forms but the simplest is to number each option. All the user has to do is to press the correct number on the keyboard. It is the options which constitute the independent sections.

We will develop a program which is menu driven whilst describing the techniques used and how they apply to any program of that type. The program is a graphics character generator which allows you to develop a large character composed of 12 normal-sized characters arranged as three rows of four columns. The large character is drawn eight times full size on a grid occupying the full screen with a 'pen' which is capable of both drawing and rubbing out. The final large character can be displayed full size and saved on tape for future use by Program 1 and Program 2.

The second program uses the characters to illustrate the letters of the alphabet and is intended as a teaching program for young children. It is also menu driven to further illustrate the techniques.

You will probably have met a menu driven program on the second side of

continued on page 166

```

10 REM BIG GEN
20 REM © A. Pratt 1984
30 REM
40 LET a=0: LET new=a: LET b=1
50 LET e=7
60 PAPER e: INK a: BRIGHT a
70 DIM n$(10): DIM e$(13): DIM
d(8)
80 DIM c(24,4): DIM a$(24,32)
90 POKe 23658,8
100 RESTORE 6000
110 FOR i=new TO 15: READ j$: P
OKe USR " "+i,VAL j$: NEXT i
120 FOR i=b TO 8: READ d(i): NE
XT i
130 LET w$="WAIT A MINUTE"
140 LET menu=200
150 REM Menu
210 BORDER e: CLS: PRINT INK e
PAPER b: BRIGHT b: " BIG GR
APHICS GENERATOR
220 FOR i=b TO 3: BEEP .03,3: B
EEP .06,1: NEXT i
230 PRINT AT 2,e: BRIGHT b: "Set
act your option"
240 PRINT AT 4,e: "Draw a New Ch
racter"
250 PRINT AT 6,e: "Instructions"
260 PRINT AT 8,e: "Redraw Existi
ng Character"
270 PRINT AT 10,e: "Display the
Character"
280 PRINT AT 12,e: "Display the
Numbers"
290 PRINT AT 14,e: "Save the Cha
racter"
300 PRINT AT 16,e: "Use a Saved
Character"
310 PRINT AT 18,e: "Use Graphics
a to L"
320 PRINT AT 20,e: "End the Prog
ram"
330 LET j=4
340 LET i=CODE INKEY$-48: IF i>
0 AND i<10 THEN GO TO 400
350 PRINT INK a: AT J,2: (J-2)/2
370 LET j=j+2: IF j=22 THEN LET
j=4
380 PRINT INK e: AT J,2: (J-2)/2
390 GO TO 350
400 REM Sort out choice
410 GO TO i+300+200
500 REM New character

```

Program 1.

```

510 BORDER 5: CLS: PRINT AT 2,
a: BRIGHT b: "New Character": AT 1
a: BRIGHT b: "INITIALISING."
520 DIM c(24,4): DIM a$(24,32)
530 FOR i=b TO 24: PRINT AT e,1
540 FOR j=b TO 32
550 LET a$(i,j)="0"
560 NEXT j: NEXT i
570 BORDER 6: CLS: PRINT AT 2,
a: BRIGHT b: "INSTRUCTIONS"
580 PRINT "Use the arrow key
s to move around the a
590 PRINT "To turn the pen on
and off press the 0 key."
600 PRINT "Once the pattern
is complete press , C , to c
ontinue."
610 GO SUB 5000
620 BORDER e: CLS
630 FOR i=a TO 255 STEP 8
640 PLOT i,a: DRAW a,175: NEXT
i
650 FOR i=a TO 175 STEP 8
660 PLOT a,i: DRAW 255,a: NEXT
i
670 FOR i=a TO b: FOR j=a TO 31
680 PRINT #0; AT i,j: "S"
690 NEXT j: NEXT i
700 LET new=b: GO TO 4200
800 REM Instructions
810 BORDER 5: CLS: PRINT AT a,
a: BRIGHT b: "INSTRUCTIONS"
820 PRINT "SIG GEN allows you
to draw largeGraphic Characters
composed of 12 normal character
s arranged as 3 rows of 4 charact
ers."
830 PRINT "Each normal character
is made up of 64 pixels (or dot
s) on a 6x8 grid hence each larg
e character is composed of a 32x
64 grid."
840 PRINT "The character is dra
wn magnified 8 times. A highlight
ed cursor square is moved arou
nd the grid using the arrow keys
"
850 PRINT "The cursor (+) is be
st treated as the tip of a pen.
which can beset to draw or rubou
t using the 0 key"
860 PRINT "Select options 1,7

```

```

or 8 when the program is first RU
N." GO SUB 5000
870 GO TO menu
1100 REM Old Character
1210 IF NOT new THEN GO TO 3000
1120 GO TO 4000
1400 REM Display Character
1410 IF NOT new THEN GO TO 3000
1420 BORDER 6: CLS: PRINT AT 2,
a: BRIGHT b: "Display the Charact
er"
1430 GO SUB 5100
1440 FOR i=5 TO 21 STEP 8
1450 PRINT AT 11,i: "ABCD": AT 12,
i: "EFGH": AT 13,i: "IJKL"
1460 NEXT i
1470 GO SUB 5000
1480 GO TO menu
1700 REM Display Numbers
1710 IF NOT new THEN GO TO 3000
1720 CLS: PRINT AT 2,8: BRIGHT
b: "Display Numbers"
1730 PRINT "The numbers are pr
inted in four columns and repres
ent the following Graphics
Characters: "
1740 PRINT "The first 8 rows a
re: A B C DThe next 8 rows a
re: E F G HThe last 8 rows a
re: I J K L"
1750 PRINT "Once the numbers a
re displayed press any key to c
ontinue."
1760 GO SUB 5000
1770 CLS: FOR i=b TO 24
1780 FOR j=b TO 32 STEP 8
1790 IF i>22 THEN PRINT AT i-b,j
+2: c(i, (j+7)/8)
1800 IF i>22 THEN PRINT #0; AT i-
23, j+2: c(i, (j+7)/8)
1810 NEXT j: NEXT i
1820 PAUSE 0
1830 GO TO menu
2000 REM Save the Chr
2010 IF NOT new THEN GO TO 3000
2020 BORDER 5: CLS: PRINT AT 2,
a: BRIGHT b: "Save the Character"
2030 INPUT "Enter the Name (max
10 letters) " : n$
2040 PRINT AT 11,6: BRIGHT b: "Sa
ving " : n$
2050 SAVE n$ CODE USR "a", 96
2060 BORDER 4: PRINT AT 13,6: PA
PER 4: " Stop the tape
2070 GO SUB 5000

```


continued from page 165

the **Horizons** tape in the form of "character" which is also a graphics character generating program. In that case only one screen display is used with the menu occupying the lower portion of the screen. Options are selected by pressing the appropriate letter keys.

Before describing Program 1 it is worthwhile looking at some general practices which can be adopted when writing any program. Those result in the program lines 10 to 150 and are arranged as follows. Lines 10 to 30 are REM lines which contain the title, and a copyright notice enabling the program to be easily identified by the first few lines. Frequently used numbers are assigned to variables in line 40. The screen colours are established in line 50 whilst all the arrays are DIMensioned in lines 60 and 70. The POKE in line 100 is a useful means of setting CAPS LOCK on.

Lines 120 to 130 read in the necessary data for the user defined graphics and array d<> with line 110 reminding you where to find the first data line. Line 140 contains a frequently used message which is held in w\$.

The most commonly used GO TO statement, at the end of each option section, refers to the start of the Main menu. To assist in identifying those the variable 'menu' is set equal to 200, which is then treated as a line number in the statement 'GO TO menu'.

The variable 'new' in line 40 is used to detect if a character has been generat-

new: detects if the data associated with the program has been changed. 0=no, 1=yes. a=0, b=1, c=7: these frequently used numbers are stored in variables which are then used in place of the numbers to save memory.

menu=200 (defines the line number 200). n\$(10) contains the name of the character (used in LOAD/SAVE to tape).

i\$ and s\$ are frequently used questions.

c\$(32) used to blank out a full line on the screen.

i, j, lim are temporary variables.

w=address of the bytes for the character selected in ROM.

t=address of the graphic character in the data.

xsize and ysize define the magnification of the character printed by the subroutine at line 7000.

xpos and ypos are the x and y coordinates of the character printed by the subroutine at line 7000.

Table 2. Variables for Program 2.

ed and prevents you using options 4, 5 or 6 before you have selected 1, 7 or 8.

Now to the main program section which contains the menu. That occupies lines 200 to 390 and starts with a REM line to identify the section. It is good practice to use as many REM lines as possible when writing a program to make it easier for others to understand. The fully developed program was written to run on a 16K Spectrum which still has enough memory to support an adequate number of REM lines.

You will notice the use of the PRINT AT function in all the following lines in order to produce a screen display which is both tidy and easy to understand. Whenever I write a program containing screen displays I always sit down with a

```

10 REM Alphabet Learner
20 REM © A. Pratt 1984
30 REM
40 CLEAR 30099: LOAD ""CODE :
50 BEEP 1,12
50 LET a=0: LET new=a: LET b=1
50 LET e=7
60 PAPER e: INK a: BORDER e: B
RIGHT a
70 DIM n$(10): DIM c$(32): POK
E 23555,8
80 LET i$="" Select a Letter ?
90 LET s$="Select your option"
100 LET menu=200
110 REM Menu
120 BRIGHT 8: BORDER e: CLS: P
RINT INK e: PAPER b: BRIGHT b: ""
ALPHABET LEARNER
130 FOR i=b TO 3: BEEP .03,3: B
EEP .05,b: NEXT i
140 PRINT AT 8,e: BRIGHT 1:s$
150 PRINT AT 11,e: "Instructions
250 PRINT AT 13,e: "Learn by Pic
tures"
260 PRINT AT 15,e: "Examine old
pictures"
270 PRINT AT 17,e: "Load in new
pictures"
280 PRINT AT 19,e: "End the prog
ram"
290 LET j=11: LET lim=6: GO SUB
4300
400 REM Sort out choice
410 GO TO i*500
420 REM Instructions
430 CLS: PRINT AT a,9: BRIGHT
b: "Instructions"
440 PRINT ""ALPHA" is a teach
ing program to help young childre
n learn the letters of the Alp
habet. PRINT ""Select option 2 to
obtain a large version of a
ny letter withan associated pict
ure.
450 PRINT ""The pictures are d
rawn with the help of the progra
m "BIG GEN" and then loaded in
to "ALPHA" by selecting option 4
460 PRINT ""Whenever new pictu

```

Program 2.

32 by 24 grid representing the full screen and plan the layout with a pencil and rubber before attempting to write any program lines.

Following the title and the instruction 'Select your option' which are both highlighted, the various options are spelt out in short titles which are intended to be self explanatory. As with all good menu programs there is a choice titled 'Instructions' which will enable the first time user to understand

```

2050 GO TO menu
2100 REM Use Saved Chr
2200 BORDER 5: CLS: PRINT AT 2,
e: BRIGHT b: "Use a saved Character"
2300 INPUT "Enter the Name (max
10 letters):" n$
2400 PRINT AT 11,6: BRIGHT b: "
Loading..."
2500 PRINT AT 13,6: INK 2: FLASH
Start the tape
2600 LOAD n$CODE: PAPER "a"
2700 BORDER 4: PRINT AT 11,6: B
RIGHT b: "Loaded"
2800 PRINT AT 13,6: PAPER 4: "
PRINT AT 15,8: ""
2900 BRIGHT b:w$
3000 REM Fill c()
3100 LET m=a
3200 FOR k=a TO 16 STEP 8
3300 FOR j=b TO 4: FOR j=b TO 8
3400 LET c(j+k,i)=PEEK(USR"a"+
3500
3600 LET m=m+1
3700 NEXT j: NEXT i: NEXT k
3800 REM Fill a$(i)
3900 FOR i=b TO 24: PRINT AT e,1
4000 FOR j=b TO 4
4100 LET t=c(i,j): LET t$="00000
4200
4300 FOR k=b TO 8
4400 IF t=d(k) THEN LET t$(k)="
4500 LET t=t-d(k)
4600 NEXT k
4700 LET a$(i,j$-7 TO j$8)=t$
4800 NEXT j: NEXT i
4900 PRINT AT 15,9:e$
5000 GO SUB 5100: LET new=b
5100 GO SUB 5000
5200 GO TO menu
5300 REM Use existing chrs
5400 BORDER 5: CLS: PRINT AT 2,
e: BRIGHT b: "Use existing Graphi
Characters"
5500 I,J,K,L
5600 GO TO 2380
5700 REM Read
5800 BORDER 4: CLS: PRINT AT 2,
e: BRIGHT b: "THE END" : AT 15
10: "BYE FOR NOW"
5900 GO SUB 5100
6000 STOP
6100 REM Error

```

```

3010 BORDER 2: CLS: PRINT AT 10
b: BRIGHT b: "There is no existi
ng character"
3100 PRINT AT 15,5: BRIGHT b: "Re
fer to Instructions"
3200 GO SUB 5000
3300 GO TO menu
4000 REM Redraw
4100 CLS
4200 FOR i=b TO 22
4300 FOR j=b TO 32
4400 IF a$(i,j)="0" THEN PRINT "
4500 IF a$(i,j)="1" THEN PRINT "
4600 NEXT j: NEXT i
4700 FOR i=23 TO 24
4800 FOR j=b TO 32
4900 IF a$(i,j)="0" THEN PRINT #
5000 IF a$(i,j)="1" THEN PRINT #
5100 AT i-23,j-1:"T"
5200 NEXT j: NEXT i
5300 REM Reset variables
5400 LET r=8: LET c=r: LET p=-1
5500 LET r=r: LET c1=r: LET out
=r
5600 GO TO 4450
5700 REM Loop
5800 PAUSE VAL "2"
5900 IF INKEY$="C" THEN LET out=
1: GO TO 4390
6000 LET q=IN 63486: LET w=IN 61
4290
6100 IF q<192 THEN LET q=q+64
6200 IF q<192 THEN LET w=w+64
6300 IF w/2-INT(w/2)=a THEN LET
p=-p: FOR i=b TO e: NEXT i: GO
TO 4450
6400 IF q=255 AND w>253 THEN GO
TO 4250
6500 IF q<255 AND c<>a THEN LET
c1=c-b
6600 AND c<31 THEN LET c1=c+b
6700 THEN LET r1=r+b
6800 IF (w=239 OR w=235) AND r<>
23 THEN LET r1=r+b
6900 IF (w=247 OR w=243) AND r<>
0 THEN LET r1=r-b
7000 REM Set array
7100 IF r<22 THEN PRINT AT r,c:i
$
7200 IF r>21 THEN PRINT #0: AT r-
22,c:i$

```

```

4420 LET a$(r+1,c+1)="0"
4430 IF p=b THEN LET a$(r+1,c+1)
="1"
4440 LET r=r1: LET c=c1
4450 IF out THEN GO TO 4500
4460 LET i$="S": IF p=b THEN LET
i$="T"
4470 IF r<22 THEN PRINT AT r,c:
BRIGHT 1:i$: OVER b:CHR$ 8+"r"
4480 IF r>21 THEN PRINT #0: AT r-
22,c: BRIGHT b:i$: OVER b:CHR$ 8
+"r"
4490 GO TO 4250
4500 REM Calculate
4510 BORDER 5: PRINT AT 11,10: B
RIGHT b: FLASH b: "CALCULATING"
4520 FOR i=b TO 24
4530 FOR j=b TO 25 STEP 8
4540 LET c(i,(j+7)/8)=VAL ("BIN
"+a$(i,j TO j+7))
4550 NEXT j: NEXT i
4560 REM Fill Graphics
4570 LET m=a
4580 FOR k=a TO 16 STEP 8
4590 FOR i=b TO 4
4600 FOR j=b TO 8
4610 POKE USR "a"+m,c(j+k,i)
4620 LET m=m+b
4630 NEXT j: NEXT i: NEXT k
4640 GO TO 4400
4650 PRINT #0: AT b,3: FLASH b: "P
ress any key to continue": PAUSE
0
5010 RETURN
5100 FOR i=5 TO 21 STEP 4
5110 PRINT AT 7,i:"ABCD": AT 8,i:
"EFGH": AT 9,i:"IJKL"
5120 NEXT i
5140 RETURN
5000 DATA "128","128","128","128
","128","128","128","255"
5010 DATA "127","127","127","127
","127","127","127","0"
5020 DATA 128,64,32,16,8,4,2,1
7000 REM Save program
7010 SAVE "BIG GEN"
7020 BEEP 1,12: STOP

```



```

res are loaded you will be asked
to re-record this program."
990 GO SUB 5000: GO TO menu
1000 REM Learn
1010 CLS: PRINT AT a,6; BRIGHT
b; "Learn by Pictures";
1030 GO SUB 4400
1110 BRIGHT b; CLS: INK 2
1130 LET w=15360+i*8
1140 LET lim=a: LET xpos=77: LET
ypos=167
1150 LET xsize=9: LET ysize=xsize
1160 GO SUB 7000: INK 4
1230 LET w=15360+(i+32)*8
1240 LET xpos=93: LET ypos=79
1260 GO SUB 7000: INK 5
1300 PRINT INK a; AT 5,12; "is for
1330 LET w=(i-65)*96+30100
1340 LET lim=11: LET xpos=152: L
ET ypos=79
1350 LET xsize=3: LET ysize=xsize
1360 GO SUB 7000
1400 LET t=30100+(i-65)*96
1410 GO SUB 4100: INK b
1440 FOR i=2 TO 6 STEP 4
1450 PRINT AT i,21; "ABCD ABCD";
AT b+i,21; "EFGH EFGH"; AT 2+i,21;
"JKLM JKLM"
1460 NEXT i: INK a
1480 GO SUB 5000: GO TO menu
1500 REM Examine
1510 BORDER S: CLS: PRINT AT b,
6; BRIGHT b; "Examine old Picture
s"
1520 PRINT AT 4,2; "Examine the P
resent Pictures. associated wi
th the letters."
1530 PRINT AT 6,e; BRIGHT b;$
1540 PRINT AT 11,e; "Examine old
Picture"
1550 PRINT AT 13,e; "Return to ma
in menu"
1600 LET j=11: LET lim=3: GO SUB
4300
1650 IF i=2 THEN GO TO menu
1700 CLS: PRINT AT e,6; BRIGHT
b; "Present Picture"
1710 GO SUB 4400
1740 LET t=30100+(i-65)*96
1750 PRINT AT 15,a;c$: GO SUB 41
00

```

```

1770 PRINT BRIGHT b; AT 10,14; "AB
CD"; AT 11,14; "EFGH"; AT 12,14; "IJ
KL"
1790 GO SUB 5000: GO TO 1510
2000 REM Load
2010 BORDER 6: CLS: PRINT AT b,
6; BRIGHT b; "Load in New Picture
s"
2020 PRINT AT 4,2; "Change the ex
isting Pictures. associated wi
th the letters."
2050 PRINT AT 8,e; BRIGHT b;$
2060 PRINT AT 11,e; "Load new pic
ture"
2080 PRINT AT 13,e; "Return to ma
in menu"
2100 LET j=11: LET lim=3: GO SUB
4300
2150 IF i=2 THEN GO TO menu
2190 LET new=b
2200 CLS: PRINT AT e,6; BRIGHT
1; "Load New Picture"
2210 INPUT "Name of new picture
?"; n$
2220 PRINT BRIGHT b; AT 10,e; "Loa
ding n$"
2230 PRINT INK 2; FLASH b; AT 12,
e; "Start the tape"
2240 LOAD n$ CODE USR "a"
2250 PRINT AT 10,a;c$: AT 14,a;"
AT 12,14; "JKLM"
2260 PRINT PAPER 4; AT 12,e;" 31
op the tape"
2270 LET t=30100+(CODE n$(1)-65)
*96
2280 PRINT AT 12,a;c$: BRIGHT b;
AT 10,14; "ABCD"; AT 11,14; "EFGH";
AT 12,14; "JKLM"
2290 GO SUB 5000: GO TO 2010
2500 REM End
2510 IF new THEN GO TO 6000
2520 BORDER 4: CLS: PRINT AT 10
1,10; BRIGHT b; "THE END"
2540 PRINT AT 15,10; BRIGHT b;"B
YE FOR NOW"
2550 STOP
4000 REM Transfer 1
4010 FOR i=a TO 95
4020 POKE (i+t),PEEK (USR "a"+i)
4030 NEXT i: RETURN
4100 REM Transfer 2
4110 FOR i=a TO 95
4120 POKE (USR "a"+i),PEEK (i+t)
4130 NEXT i: RETURN
4300 REM Input 1

```

```

4310 LET i=CODE INKEY$-48: IF i >
0 AND i < lim THEN RETURN
4320 PRINT INK a; AT j,2; (j-9)/2
4330 LET j=j+2: IF j=lim*2+9 THE
N LET j=11
4340 PRINT INK e; AT j,2; (j-9)/2
4350 GO TO 4310
4400 REM Input 2
4410 LET j=b: PRINT AT 15,6;i$
4420 LET i=CODE INKEY$: IF i>64
AND i<91 THEN RETURN
4430 PRINT BRIGHT b; AT 15,j+5;i$
(j)
4440 LET j=j+b: IF j=20 THEN LET
j=b
4450 PRINT AT 15,j+5;i$(j)
4460 GO TO 4420
5000 PRINT #0; AT b,3; FLASH b;"P
ress any key to continue": PAUSE
0
5010 RETURN
7000 REM Big Print
7010 FOR d=a TO lim
7020 FOR q=a TO e
7030 LET val=PEEK (w+d*8+q)
7040 FOR z=a TO e
7050 IF val-2*INT (val/2) THEN F
OR t=b TO ysize: PLOT xpos-z*xs
ize,ypos-q*ysize-t: DRAW b-xsize,
8: NEXT t
7060 LET val=INT (val/2)
7070 NEXT z: NEXT q
7080 LET xpos=xpos+xsize*8
7090 IF d=3 OR d=7 THEN LET xpos
=152: LET ypos=ypos-ysize*8
7100 NEXT d
7110 RETURN
8000 REM Save program
8010 CLS: PRINT AT 10,0; BRIGHT
1;"The program must be re-recor
ded."
8020 SAVE "ALPHA" LINE 10: BEEP
1,12
8030 SAVE "Alphacode" CODE 30100,
2496: BEEP 1,14: STOP

```

how to use the program.

The final choice allows the user to stop the program without reverting to using the BREAK key or pulling the plug out.

After printing all the titles the program needs to identify each option. In this case the numbers 1 to 9 are printed down the left hand side. That is done with lines 360 to 380 which may appear complicated but the effect produced is of a flashing band travelling quickly down the numbers and reminds the user the machine is waiting for a choice to be made.

Line 390 completes the program loop which is another essential part of a menu program. The lines 350 to 390 are repeated endlessly until a valid key is pressed which identifies a menu option. Line 350 is used to detect when that happens by looking at the contents of INKEY\$.

In Appendix A of the Spectrum Manual is the ASCII table which gives the code for each character. The codes for the numbers start at 48 and go to 57, hence by subtracting 48 from CODE INKEY\$ a number corresponding to the key pressed is obtained. That is then tested to see if it falls within the range of the options, in this case 1 to 9, and if it does the machine jumps to line 400. Line 410 directs the machine to the correct program section using the Spectrum capability of GO TO a variable — or in this case a formula using a variable — which is treated as a line number.

Type in the program lines 10 to 410

and 6000 to 6020 and save them on tape. RUN the program and you will obtain the menu on the screen with the numbers on the left flickering in sequence. Try pressing any key except the numbers 1 to 9 and nothing should happen. Now press a number between 1 and 9 and the report 0 OK, 6020:1 should appear. If it does not you can correct your mistakes and RUN the program as many times as you like until it does what it is supposed to do. As all programmers realise writing a program may seem easy but getting it to work and do what you intend is something completely different. By allowing the program to be broken into separate sections the whole program need not be written at once.

The menu section is relatively easy to write and you can copy lines 100 to 410 of this program with changes to the titles for your own menu program.

Although each option section is ideally independent of all the others, there are always some routines which are used by two or more sections. The best example in Program 1 is the routine which returns the machine to the Main menu and consists of a subroutine at line 5000. In general all common routines should be separated from the option sections and written as subroutines near the end of the program.

As well as using subroutines the program also contains two routines which are used by two option sections but are entered at different points by each section. The first of those has been taken

out of the option section and located between lines 4000 and 4690. That is the main drawing routine and is itself separated into sections by REM lines which identify entry points. It also contains its own subroutine at line 4600 which changes the characters in a\$. The array represents the full character using '0' for an empty square and '1' for a filled in square. The drawing loop, lines 4250 to 4490, is repeated until the character is complete and key 'C' is pressed.

The second routine is associated with using either a SAVED character or the existing graphic characters USR "A" to USR "L". It contains two routines for filling the arrays c<> and a\$<> and is located within the section associated with option 7. The other option, 8, enters the routine at line 2380.

When developing the program the drawing routine was written after the main menu section. To check its operation it was necessary to include an option section to access it. When developing your own menu program you will probably follow the technique adopted of writing each option section and then testing it before proceeding with the next. Rather than use that approach now, type in the whole of the remainder of the program. Note the letters S and T in lines 680, 4050, 4090, 4100 and 4460, and letters A to L in lines 1450 and 5110 are graphics characters.

Once complete RUN the program again and press key 2. That will pro-

continued on page 168

continued from page 167

The last option, 8, allows you to use the existing graphics characters A to L. It is intended to be chosen instead of option 1 when the program is first RUN and allows you to use characters from another program which are preserved when NEW is used to delete that program.

The main menu is located from lines 200 to 290 with the options listed in lines 240 to 280. It is similar in layout to the menu in Program 1 and could be adapted to any requirement simply by changing the words. Line 290 contains a GOSUB 4300 statement which handles the INPUT of a valid option number. The reason for using a subroutine is because two of the main menu options also contain their own menus hence a common routine can be used. Remember that any common routines should be separated out as subroutines and placed near the end of the program. The variable 'J' is set to the row number

Once loaded the main menu will appear and I suggest you select option 1 first. Now you can load all those characters you saved on tape and begin to teach your children the Sinclair character set.

```

10 REM                               Data Loader
20 REM                               @ M. Pratt 1984
30 REM
40 CLEAR 30099
50 FOR i=30000 TO 30483
60 READ val: POKE i,val
70 NEXT i
80 STOP
90 DATA
100 DATA 0,0,0,0,0,0,0,0,1,95,48
127,127,7,6,115,251,160,199,2,6,100
155,124,0,56,0,0,128,128,0,0,0,0
110 DATA 3,7,7,15,15,31,31,31,2
255,255,255,255,255,255,255,255,1
90,255,255,255,255,255,255,255,0
120 DATA 123,123,123,123,123,123,123,123,0
255,255,255,255,255,255,255,255,0
255,255,255,255,255,255,255,255,0
255,255,255,255,255,255,255,255,0
130 DATA 0,0,0,0,31,63,98,98,98,98,
0,255,255,0,105,105,40,0,255
125,32,160,160,160,0,248,252,
134,134,34,134,34
140 DATA 127,127,127,127,127,127,127,127,66
78,110,255,255,255,255,255,255,0
4,104,255,255,255,255,255,255,32,38
254,254,254,254,254,254,146,146,1
46
150 DATA 66,127,123,119,111,111
0,34,48,255,127,184,216,223,128,
134,255,102,255,255,247,3,1,146,2
42,178,255,102,255,255,192,128
160 DATA 4,14,4,4,4,4,4,4,0,0,0
0,128,192,224,112,92,5,4,0,0,0
0,0,0,0,0,0,0,0,0,0,0,0
170 DATA 4,4,4,4,4,4,14,4,42,21
10,5,2,2,1,0,0,128,128,64,160,1
7,47,156,0,32,32,32,32,248,248,1
27
180 DATA 2,2,10,4,0,0,0,0,0,0,0
0,0,0,0,79,61,31,15,21,48,255
15,127,127,248,252,85,5,170,252,
190 DATA 4,61,132,143,252,165,3
6,62,16,248,144,128,192,128,7,63
0,0,0,0,0,0,248,255,0,0,0,0,0
102
200 DATA 63,121,121,127,127,63,
62,255,127,159,239,247,255,127,127,
255,255,255,255,254,253,251,127,
229,248,252,254,255,253,249,249,
249
210 DATA 7,6,12,24,16,24,12,0,2
4,24,96,32,32,32,32,96,134,6,6
16,48

```

Program 3.

MATCH DAY

Match Day is no ordinary soccer game. Blistering 3-D action, total animation and automatic camera scan are just some of the intricate techniques which make Match Day the league

leader of soccer games. Now follow the "Action":

Your striker traps the ball from a perfectly placed corner-kick, takes on the defender and dribbles neatly round him making space to

his powerful half-volley rattles the cross-bar, the ball returns, floating menacingly above the penalty

area and your star striker seizes this half-chance



chip in a teasing cross-ball to his advancing team mate in the



to head the ball decisively into the back of the net... GOAL!



six-yard box. There is no time to control the ball, your player must commit himself to a snap shot on goal...



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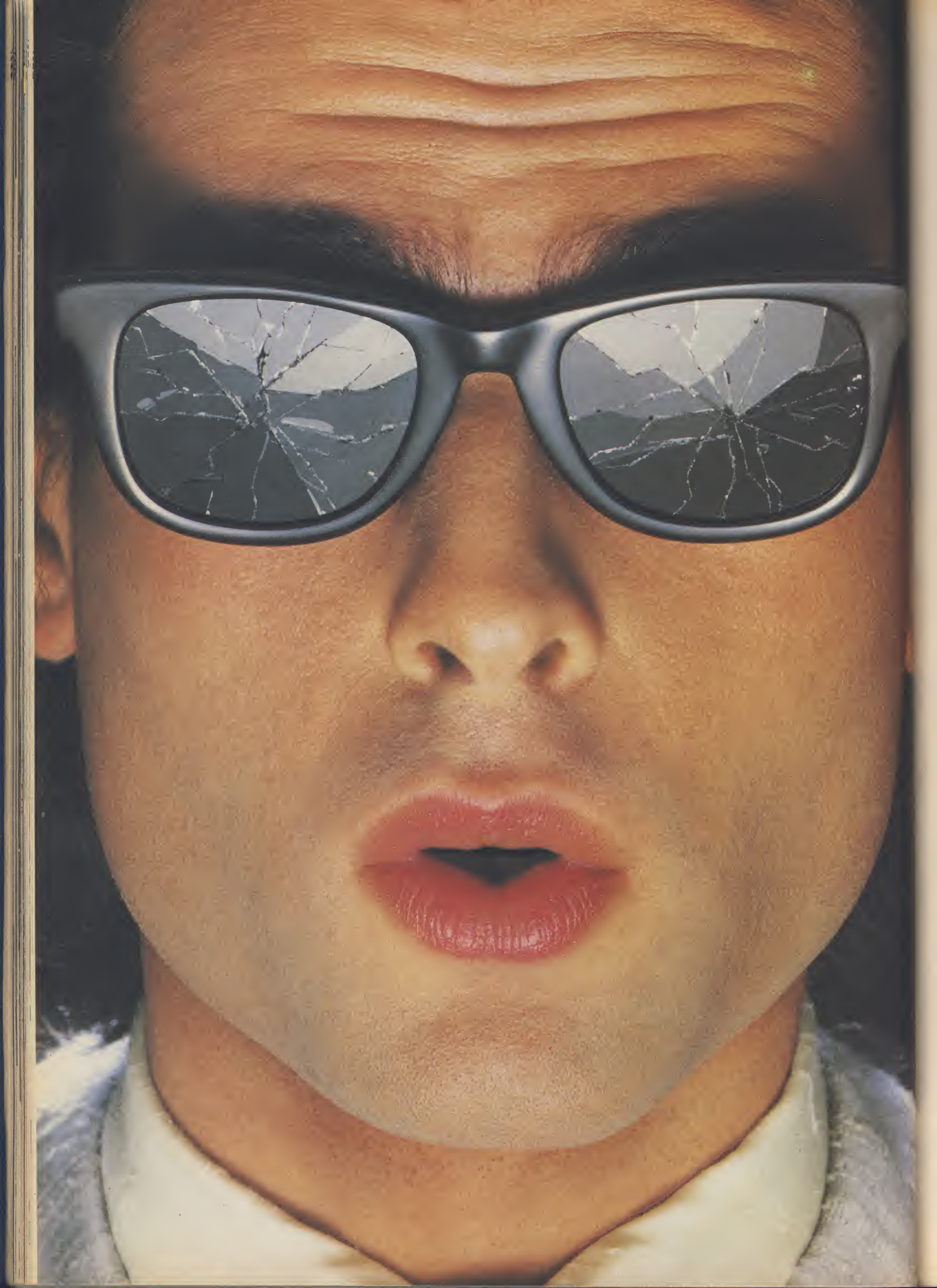
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The games Sinclair plays

Alison Maguire is one of the more successful women in the computer industry, and as software director for Sinclair Research has seen her department grow from scratch to worldwide proportions in the two years since she joined.

Things were very different on the software scene then, back in January 1983. The Spectrum had been on the market for seven months and Sinclair had been involved in software at a marginal level only, with very few titles available. People who bought Spectrums around that time will remember only too well the level of software provision — certainly nothing in comparison to what is available today.

What, then, are her main considerations as software director? "I'm basically concerned with software publishing but in fact there is an overall responsibility to ensure that our hardware doesn't fail to sell for lack of software. At one end of our involvement we have a commitment to software for its own sake. At the other end we encourage companies to develop software which we might not sell ourselves, but which would make the hardware more attractive to a particular market."

To begin with the Sinclair involvement with software was limited to obtaining a licence to market software which was already being sold.

On arriving at Sinclair Research Maguire concentrated on familiarising herself with the Spectrum and the ZX-81, as well as the various titles which were available. Her main task was to take account of the market and the products and then to define a software strategy, although as she says, "It's very difficult to define an overall software strategy as we are really a hardware manufacturer. For example, when it comes to deciding to bundle software, I lose part of my product line, but if we sell another 50,000 computers because of it then it's very worthwhile."

The QL is the first computer which has seen activity on the software front from inception, exemplified by the inclusion of the Psion packages in the hardware product. "Since the launch in January, about 300 companies have written to us, asking for a variety of assistance with both the development of software and peripherals. That puts us in a very nice position for identifying products we are interested in."

That also generates feedback of ideas and Maguire's department is in the front line of liaison between the labs and the various companies who apply

for assistance. Those companies provided an early testing ground for the QL, and indeed some were paid to do that work. Such an arrangement is an advantage in that any bugs which might exist can be eliminated at an early stage with full cooperation between the labs and the software house concerned.

Since the early days things have

"People in Britain don't want to be educated at home. Most parents want to buy something that amuses their children."

changed a great deal. Maguire now oversees a department comprising of two editors, a software engineer, two secretarial/PA people and a software product manager responsible for marketing and to a certain extent production as well.

"This size of team is pretty new; in June 1984 I had only a secretary. There is now a greater commitment to software. The aim is to go into software publishing for the QL and to take advantage of the fact that we are the hardware manufacturer."

Although almost half the Spectrum sales are overseas, the Spectrum+ will have a further impact on those markets. The new user guide will have been translated into 19 languages by Christmas 1984 and software sales will presumably follow hardware. How does Sinclair Research intend to take advantage of that?

"There are various ways in which we are tackling it. Wherever we've got a new branch office — as in Germany, Italy or France — we have local software managers already appointed. I will meet them regularly so we have information flowing back and forth. We are looking at a variety of arrangements for getting English software translated, though it's not always appropriate to translate software."

In recent months large foreign publishing companies have approached Sinclair as to distribution rights. If local branch offices agree Sinclair may deal direct especially if the company has a sound background. "Up until now it's been only titles in our catalogue for which we have discussed foreign rights.

There hasn't been anyone who has had the time to think carefully about foreign rights, because we have been so busy setting up the new department and the QL. We are now thinking about it and it's occurred to me that as with the expansion pack, which is totally non-Sinclair, it may be time to offer non-Sinclair suppliers a chance to get at our distributors. I'm considering ways to invite people to do so. In some foreign markets it is very difficult to make money out of software but we still need it to be there. If we can provide an easy route for the software to be there legally then we will make it less easy for the pirates."

There has been a lot of talk about the education market overtaking the games market. "Last year we were talking about schools and the DoI scheme, in which the Spectrum was involved. We published some titles in association with Macmillan and I wanted Sinclair to be involved with a respected long-standing name in education because I thought we were viewed possibly as fly-by-nights.

"However, that market has been disappointing. I think that whether or not all the educationalists would like it, educational software has not sold well. People in Britain don't want to be educated at home, unlike in the States. The idea was ahead of its time, but it may happen soon because educational software now is more entertaining than before. The difficulty is deciding who are you selling to, parents or children. Most parents are indulgent and want to buy something that amuses their children."

Edutainment? "I loath that word. Although the extraordinary thing is I sometimes wonder whether our view, as adults, about what children should enjoy, is wrong."

Maguire was recently sent a program which was a simulation of property dealing and rent management and her two daughters of nine and 11 spent a whole day playing with it.

"They said it was the best program they had ever played, and at the end of that time they knew what a balance sheet was and something about the relationship between managing people and making profits. I was amazed at this; it wasn't the zap-it-up game which they usually like. Nevertheless it's difficult to sell that type of game to retailers."

What does she feel about the current image of computers, dominated by games which appeal mostly to boys?

continued on page 176

See Micronet 800 in action.

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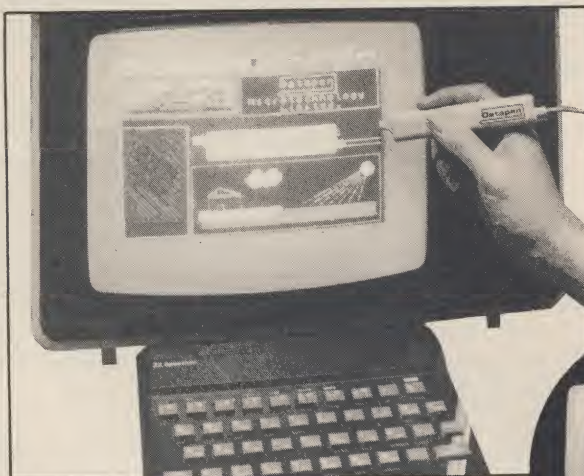
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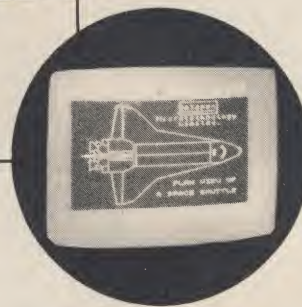
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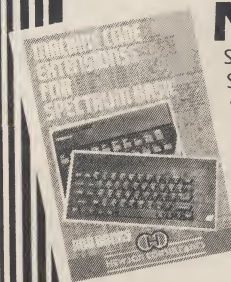
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continued from page 173

"Obviously, when we look for software here we try to discourage violence but if we apply that kind of rule rigidly we would be turning down half the games. I think perhaps that zap-it-up games are becoming a little bit old hat. But then for every group of people for whom it is old hat there's another group coming up."

Maguire sees big growth ahead in the tertiary sector of education — that is, the universities and polytechnics as well as abroad. She would like to concentrate on titles which showed the machines to be something special, as rule and drill programs are scarcely likely to distinguish Sinclair machines from any other. A computer which may be an intelligent work station for university students would sell in large quantities at corporate level. Sinclair is hoping that the QL will fulfil that need. The BBC micro has been the mainstay of this market, and the QL will have to work hard to beat it.

What plans are there for QL software in the next six months? "Our first titles were announced in QLub news in October. A lot of it is development software, things like compilers which have a roll-on effect. We also have some business

software coming out before the end of this year. We've got the Psion chess program too, but I must say games are not the major emphasis for the QL, although the chess program is important as it shows what the QL can do visually. We'll be launching titles every month now for the QL."

A number of people are, however, working on games for the QL and Sinclair has bought an option on the Imagine megagame **Bandersnatch**. Psion, too, has games under development.

Talk of that kind could lead easily to the idea that Sinclair had now forsaken the Spectrum in favour of the QL, and many Sinclair users must feel this way. Does this mean that the Sinclair involvement with Spectrum software in the U.K. will be limited to carrying the present titles?

"Oh no. Not at all. The Spectrum + is an indication that we think there's a lot of life in that little horse yet. We published seventeen titles for the Spectrum in the autumn. They are all 'educational', fifteen from Macmillan and two from Psion and ASK. There's a tremendous mileage in the Spectrum and we'll certainly be looking for more software for it, although when there's the choice between making some money

out of a new game for the Spectrum, which is not going to sell any more Spectrums, and making a piece of software available for the QL which is going to sell the QL to a whole new market, my emphasis has to be on the latter."

It is clear that Sinclair is now poised for overseas expansion, and the groundwork for a large multinational company is being laid. No doubt when the QL production lines have satisfied the demand in the U.K., that too will follow in the steps of the Spectrum. Just as a Coke can be found in extraordinary places, intrepid travellers may find a Spectrum where they least expect it



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GLOSSARY

Basic — Beginners' All-purpose Symbolic Instruction Code. A programming language resembling English which is used by beginners because most popular microcomputers have it as standard.

Bug — an error in a program.

EPROM — Erasable Programmable Read-Only Memory. Semi-permanent storage. Information is not erased if the power is turned off in the computer. Programs can be erased by subjecting the memory chips to ultra-violet light. The memory can then be re-programmed using an electrical device called an EPROM blower.

Interface — RS232 and Centronics. A device which enables other computers or add-ons, such as printers, to be connected to the computer. It converts non-standard signals from add-ons to the standard signals of the computer in use.

Kilobyte — (K). A measurement of memory size. Most machines use 16K as a minimum but 48K is generally agreed to be necessary for serious work.

Machine code — an electronic pulse code used by the computer to perform functions and communicate with memory and other devices.

Mnemonics — abbreviated instructions — for example LD for Load — used in machine language programming.

Motherboard — an external printed circuit board which is used like a multi-way plug planner. It enables other printed circuit boards, such as graphics boards and colour boards, to be slotted-in.

Port — a link to the outside world which can be used by programs and the computer.

PCB — printed circuit board. A board which has on it the electronic circuits of the computer.

RAM — Random Access Memory. Information and programs can be stored in this type of memory as electronic pulses which conform to a set of numbers — machine language — in which programs are represented in the computer. When the power is turned off the information will be lost.

ROM — Read Only Memory. Information stored in this type of memory is not lost when the power is switched off.

Software — programs which control the operation of the computer.

Syntax error — a bug caused by incorrect use of a programming language.



Our easy-to-follow guide for new owners

The basic route to a habit-forming hobby

BUYING a Sinclair machine can be the start of a life-time's obsession with home computing. It is easy, however, to become discouraged if everything does not go according to plan from the beginning.

For those with only a little knowledge of computers and their capabilities, the best way to approach the machines is to abandon any ideas for special uses. While the QL computer is big enough for use in small businesses, the Sinclair computers are not really suitable for major uses. It is better to become accustomed to the many facilities and then decide how you wish to use them.

Begin by unpacking your machine, overcoming your surprise at its size and weight and, following the manual, set up the system. If you cannot get the K on the screen, check that everything is plugged into its correct socket and re-set the machine by pulling-out the power plug for one second and try tuning-in again. If still nothing appears, check the power supply unit by shaking it. If it rattles, return it. If it is satisfactory, check your system with that of a friend.

If you have a Spectrum you will have received an introductory booklet which explains what the computer can do and giving detailed instructions on how to set it up. Also included is a fault-finding guide.

Once the K appears you are ready to begin learning about your machine. It can prevent family arguments if you can afford a separate television set for your system. It also makes life easier if you find somewhere to leave your equipment set up permanently. You will find that a

few power sockets are needed and a four-way block connector on a short length of extension cable will help to tidy trailing leads.

When using a Spectrum, a television set has to be more finely-tuned than when using a ZX-81 because of the added dimension of colour. If the set is not tuned properly, the colours will look hazy instead of sharp and clear. If no colour can be seen when it is switched on, the power supply or the television set may be at fault.

Some users have experienced some difficulty with some television sets, which include Hitachi, Grundig and Toshiba. Sets which many people have found compatible include the Sony Trinitron, Fidelity and Ferguson. Recent changes in the ULA should make more sets compatible.

The manuals are written in great detail and are reasonably easy to follow. Some of the chapters may not seem immediately relevant but it is worthwhile reading them as you might miss something important.

Patience is needed at that stage to learn the ways in which the computer will accept information. It is tempting to try to enter programs before you are ready but that is likely to lead to errors. For example, words like AND, THEN and AT should not be typed-in letter by letter.

By the time you have reached chapter 11 in the ZX-81 manual and chapter 19 in the Spectrum manual you should have accumulated sufficient knowledge to be

continued on page 182

continued from page 181

able to type-in other people's programs, such as those in *Sinclair User* and *Sinclair Programs*, without too much difficulty.

It is important when using the ZX-81 that it is not jolted. Some of the connections can easily work loose and everything which has been entered will be lost.

The manuals are not to everyone's liking and if you find them difficult to follow a number of books on the market can help you. Find the one which suits you best.

As a way of relaxing you can buy some of the growing range of commercially-produced software. That can be loaded directly from cassette but make sure that your machine is big enough to take the tapes you buy.

For the ZX-81 there are a few tapes for the unexpanded 1K machine but the majority require the 16K RAM pack. Similarly on the Spectrum most companies are taking advantage of the possibilities provided by the larger 48K machine rather than providing cassettes for the 16K.

The tapes can vary in quality and it is advisable to read the reviews in *Sinclair User* and use your judgment to find the best.

An alternative method to learn about both the ZX-81 and the Spectrum is to plunge in at the deep end and see what the machines will do. Refer to the manuals when you have difficulties. You can ignore the functions and calculations initially and experiment with PRINT statements to obtain the feel of the machines.

You may already have heard about the problem involved in SAVEing and



LOADing your own cassettes. The manual gives detailed instructions but many of the early ZX-81s would not accept tapes from some recorders. That problem is said to have been overcome but there can still be difficulties.

Usually they occur when LOADing tapes recorded by other people. One simple method to overcome this is to wind the tape to the middle of the program and type LOAD "" followed by NEWLINE; then increase the volume of

the recorder slowly with the tape running until the television screen shows four or five thick black bands. If you then rewind the tape, the program should LOAD normally.

LOADing and SAVEing on the Spectrum is much easier and faster than the ZX-81. One difference is that when SAVEing on the Spectrum the LOAD lead must be disconnected either at the recorder or the Spectrum.

Finally, a health warning. Apart from any practical uses, computing with your Sinclair machine can be a very entertaining hobby and is almost certainly habit-forming. You may easily find yourself crouched over your machine, red-eyed, in the early hours of the morning thinking that in another five minutes you will solve the problem. Try to break that habit by getting into the fresh air and meeting other Sinclair users.

By obtaining a Sinclair computer you find that you have joined a not very exclusive club with many thousands of members, many of whom would be only too happy to advise you if you have difficulties.

Make sure of your regular copies of *Sinclair User* and *Sinclair Programs* and you can be guaranteed many happy hours.

SLIME

AVOID THE SENTIENT slime trail for as long as you can in **Slime** by Henry Braun of London. Eventually you will come to a sticky end but skill and cunning may keep you alive longer than you would think. The program runs on any Spectrum, and uses the cursor keys for movement.

Slime uses our special abbreviations for graphics characters, so please read the instructions on the first page of Program Printout before typing in the program.

Lines 5-10	Set up the initial values for the variables used. Most are 0 because nothing has happened yet, but x1 and y1 are given the co-ordinates for the starting point on the screen.
Line 30	The beginning of a loop containing the game. Where x1 and y1 were the co-ordinates for the slime trail, x2 and y2 will be your position. x and y are to hold the new position, but first it checks to see that move you make.
Lines 40-50	It would be easy to read the keyboard with a line like IF INKEY\$ = ... THEN ... but that is a slow and inelegant way of doing it. If there are several options you need a line for each one. Instead Henry uses logic operations. The expression (INKEY\$="6") is given the value 1 if true

```

5 LET hi=0
10 PAPER 7: INK 0: BORDER 2: C
LS : LET s=0: LET x=1: LET y=0:
LET x1=20: LET y1=30
30 LET x2=x: LET y2=y
40 LET x=x+(INKEY$="6")-(INKEY
$="7")+(x<1)-(x>20)
50 LET y=y+(INKEY$="8")-(INKEY
$="5")+(y<1)-(y>30)
55 IF SCREEN$ (x,y)="*" THEN
GO TO 1000
60 PRINT AT x2,y2;"(sp)";AT x,
y;"(cc9,ig6,cc8)"
65 LET x3=x1: LET y3=y1
67 IF RND>.5 THEN GO TO 80

```


and 0 if false. The statement as a whole in line 40 means: "If you are pressing 6 then add one to x, if you are pressing 7 then take one away from x, and if x is smaller than one add one and if it is bigger than 20 subtract one." Those last two ensure you never go off the edge of the screen.

Line 55 SCREEN\$ is a function which looks at the characters held in the screen display. This line checks to see if there is slime where you are about to move.

Line 60 The new position is blank so you can move there, and the program prints a flashing graphics character there. cc9 is an abbreviation for a control code, in this case the one which produces the flashing. It is produced by going into extended mode, then holding down CAPS SHIFT and pressing the appropriate key, in this case 9. Nothing will appear on the screen, but the next character will flash.

Line 65 Duplicates the position for the slime.

Line 67 To introduce an element of luck, the slime moves partly at random.

Lines 70-90 Compare your position in x and y with the position of the slime and alter it accordingly. The random feature ensures the slime does not always make the most efficient move towards you.

Line 100 Having survived one move, your score is increased.

Line 110 Sends you back for another move. The fact there is no line 20 is irrelevant, the next instruction will be line 30.

Line 120 Is a rather peculiar safety measure. If the program skipped past line 110 it is sent back there.

Line 1000 The game is over, and your score is displayed.

Lines 1010-1020 If you have the high-score you are told so and a new high score is displayed.

Lines 1030-1070 Ask if you want to play again. In those lines the keyboard is read with IF statements instead of the earlier logic operations, as there would be little gain to the more compressed method.

```

70 LET x1=x1+(x>x1)-(x<x1)+(x1
<1)-(x1>20)
75 IF x1<>x3 THEN GO TO 90
80 LET y1=y1+(y>y1)-(y<y1)+(y1
<1)-(y1>30)
90 PRINT AT x1,y1;"(cc4,i*,cc0
)"
100 LET s=s+1
110 GO TO 20
120 GO TO 110
1000 PAUSE 50: CLS : PRINT AT 0,
0;"You stayed alive for ";s;" mo
ves."
1010 IF s>hi THEN LET hi=s: PRI
NT : PRINT "You got the highscor
e": INPUT "What is your name? ";
a$
1020 IF hi>0 THEN PRINT "The hi
-score is ";hi;" and was(6*sp)ac
hieved by ";a$
1030 PRINT : PRINT : PRI
NT "Another game?(y/n)"
1040 IF INKEY$="" THEN GO TO 10
40
1050 IF INKEY$="y" THEN GO TO 1
0
1060 IF INKEY$="n" THEN STOP
1070 GO TO 1040

```



THE QUAINLY-NAMED **Happydays** is a calendar program which will tell you the day of the week for any given date, as long as it falls after the introduction of the Julian calendar. That will almost certainly include all of our readers' birthdays, so the program is a good opportunity to discover if you are merry and gay, or work hard for a living, according to the old rhyme.

Enter the day and month as figures, and the year in full, e.g. 1985. Happydays was written by Hsieh Min Hon of Singapore and runs on the ZX-81 in 1K.

Happy Days

```

10 PRINT "DAY?"
20 INPUT D
30 PRINT "MONTH?"
40 INPUT M
50 PRINT "YEAR?"
60 INPUT Y
70 LET K=INT (.6+(1/M))
80 LET L=Y-K
90 LET Q=M+12*K
100 LET P=L/100
110 LET A=INT (P/4)
120 LET B=INT (P)
130 LET C=INT ((5*L)/4)
140 LET E=INT (13*(Q+1)/5)
150 LET Z=E+C-B+A+D-1
160 LET Z=(Z-(7*INT (Z/7)))+1
170 PRINT D;"/" ;M;"/" ;Y;" IS A
"
180 IF Z=1 THEN PRINT "SUNDAY"
190 IF Z=2 THEN PRINT "MONDAY"
200 IF Z=3 THEN PRINT "TUESDAY"
210 IF Z=4 THEN PRINT "WEDNESDA
Y"
220 IF Z=4 THEN PRINT "THURSDAY"
230 IF Z=5 THEN PRINT "FRIDAY"
240 IF Z=6 THEN PRINT "SATURDAY"
250 STOP

```


IT IS POSSIBLE to produce quite complex line drawings on the Spectrum but many beginners are put off by the somewhat long-winded commands and the need to use co-ordinates.

Easy Draw by Frank Oliver of Knottingley in West Yorkshire takes much of the sweat away by allowing you to simply use the cursor keys. You can also draw diagonal lines automatically and use all the colours. Block graphics can be included in the picture.

The program runs on any Spectrum, and instructions are included.

The program uses our special abbreviations for graphics characters so please read the instructions on the first page of Program Printout.

EASY DRAW



```

20 PAPER 7: CLS
30 PRINT AT 0,11;"EASY DRAW";A
T 2,2;"BY F.OLIVER";AT 4,10;"INS
TRUCTIONS"
40 REM INSTRUCTIONS
50 PRINT AT 6,0;"DRAW KEYS = 1
TO 8 (1-4 diagonal 5-8 as cursor
s)"
60 PRINT AT 8,0;"COLOUR KEYS=Q
WERTYUI (same order as keyboard)"
70 PRINT AT 10,0;"KEY 9 = BRIG
HT"
80 PRINT AT 11,0;"KEY 0 = FILL
IN CURSER RUN (with desired colo
ur when finished)"
90 PRINT AT 13,0;"KEY P=PRINT
: KEY O=STOP PRINT"
100 PRINT AT 14,0;"KEY A = BLOC
K GRAPHICS (flashing cursor posit
ioned)"
110 PRINT AT 16,0;"KEY S = HIGH
RESOLUTION GRAPHICS(x,y plotted
)"
120 PRINT AT 18,0;"SPACE KEY =
RESTART"
130 PRINT AT 19,0;"KEY D=DOUBLE
DRAW SPEED(disables colours+spac
e,9,0,0-P=NORMAL)"
140 PRINT FLASH 1;AT 21,12;"AN
Y KEY"
150 PAUSE 5000
160 PAPER 7: CLS
170 REM SCREEN SET
180 PRINT AT 3,6;"SELECT BORDER
COLOUR"
190 LET a=0: LET c=8: LET d=0:
GO TO 800
200 PAPER c: CLS : BORDER c: PA
PER 7: CLS
210 PRINT AT 3,6;"SELECT SCREEN
COLOUR"
220 LET c=8: LET a=1: GO TO 800
230 PAPER c: CLS
240 REM PROGRAM VARIABLES
250 LET b=1: LET c=7: LET e=0:
LET f=2: LET h=0: LET x=10: LET
y=15
260 REM CURSOR RUN
270 FOR g=1 TO 32: PRINT PAPER
c;AT 0,h;"(sp)";AT 21,h;"(sp)":
LET h=h+1: NEXT g: LET h=1: FOR
g=1 TO 20: PRINT PAPER c;AT h,
0;"(sp)";AT h,31;"(sp)": LET h=h
+1: NEXT g: IF d=0 THEN LET h=0
280 LET c=0: LET d=1
290 REM X,Y TRACKING
300 LET xx=175-(8.333333*x)
310 LET yy=8.2258065*y
320 REM DRAW VARIABLES,CURSERS,
X,Y PLOT

```

```

330 IF x$="d" THEN LET f=3
340 IF f=3 THEN GO TO 400
350 IF x$="9" THEN LET f=1
360 IF x$="o" THEN LET f=0
370 IF x$="0" AND h=0 THEN GO
TO 270
380 GO SUB 810
390 IF h=0 THEN PRINT PAPER 0
: INK 7;AT x,0;">";AT x,31;"<";A
T 0,y;"v"
400 IF h=0 THEN PRINT INK 0;
PAPER 7;AT 21,4;"x=";INT xx;"(sp
)";AT 21,23;"y=";INT yy;"(sp)"
410 LET x$=INKEY$
420 IF x$="p" THEN LET f=2
430 IF e=1 THEN GO TO 620
440 REM HIGH RESOLUTION GRAPHIC
S
450 IF x$="a" THEN LET e=1
460 IF x$="1" THEN LET xx=xx+1
: LET yy=yy+1
470 IF x$="2" THEN LET xx=xx-1
: LET yy=yy+1
480 IF x$="3" THEN LET xx=xx-1
: LET yy=yy-1
490 IF x$="4" THEN LET xx=xx+1
: LET yy=yy-1
500 IF x$="5" THEN LET yy=yy-1
510 IF x$="6" THEN LET xx=xx-1
520 IF x$="7" THEN LET xx=xx+1
530 IF x$="8" THEN LET yy=yy+1
540 IF xx>167 THEN LET xx=167
550 IF xx<8 THEN LET xx=8
560 IF yy<8 THEN LET yy=8
570 IF yy>247 THEN LET yy=247
580 IF f=1 THEN PLOT BRIGHT 1
: INK c;yy,xx
590 IF f>1 THEN PLOT INK c;yy
,xx
600 GO TO 330
610 REM BLOCK GRAPHICS
620 IF x$="s" THEN LET e=0
630 IF h=0 THEN PRINT PAPER 7
:AT x,0;"(sp)";AT x,31;"(sp)";AT
0,y;"(sp)"
640 IF x$="1" THEN LET x=x-1:
LET y=y+1
650 IF x$="2" THEN LET x=x+1:

```

```

LET y=y+1
660 IF x$="3" THEN LET x=x+1:
LET y=y-1
670 IF x$="4" THEN LET x=x-1:
LET y=y-1
680 IF x$="5" THEN LET y=y-1
690 IF x$="6" THEN LET x=x+1
700 IF x$="7" THEN LET x=x-1
710 IF x$="8" THEN LET y=y+1
720 IF x<1 THEN LET x=1
730 IF x>20 THEN LET x=20
740 IF y<1 THEN LET y=1
750 IF y>30 THEN LET y=30
760 IF f=1 THEN PRINT BRIGHT
1; PAPER c;AT x,y;"(sp)"
770 IF f>1 THEN PRINT PAPER c
:AT x,y;"(sp)"
780 GO TO 300
790 REM COLOUR LOOP
800 PRINT AT 10,12;"Q=BLUE";AT
11,12;"W=RED";AT 12,12;"E=MAGENT
A";AT 13,12;"R=GREEN";AT 14,12;"
T=CYAN";AT 15,12;"Y=YELLOW";AT 1
6,12;"U=WHITE";AT 17,12;"I=BLACK
"
805 FOR k=1 TO 100: NEXT k
810 LET x$=INKEY$
820 IF x$="q" THEN BEEP .5,0:
LET c=1
830 IF x$="w" THEN BEEP .5,2.0
39: LET c=2
840 IF x$="e" THEN BEEP .5,3.8
6: LET c=3
850 IF x$="r" THEN BEEP .5,4.9
8: LET c=4
860 IF x$="t" THEN BEEP .5,7.0
2: LET c=5
870 IF x$="y" THEN BEEP .5,8.8
4: LET c=6
880 IF x$="u" THEN BEEP .5,10.
88: LET c=7
890 IF x$="i" THEN BEEP .5,12:
LET c=0
900 IF x$="(sp)" THEN GO TO 20
910 IF d=1 THEN RETURN
920 IF c=8 THEN GO TO 810
930 IF a=1 THEN GO TO 230
940 IF c<8 THEN GO TO 200

```


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It all started with a proposal that a package should be written that would give home users a gentle introduction to the kind of software that businesses were running on their computers.

At that stage there was no intention that it should be an ambitious package. Just a simple program that could be sold at a very low price.

First, experts in business software programming were called in and were told what was required. Their enthusiasm was immediate.

A unique feature is the double size text option in both printer and edit mode – perfect for young children and people with poor vision.

The word processor – with double size characters

But what happened next was totally unexpected. For they all came up with ideas that would considerably expand their original brief.

In the end what had been planned as little more than a beginners' guide to word processing, database management, spreadsheets and graphics

had been turned into a full scale suite of programs covering all four applications.

In fact the only part of the brief that remained was the original insistence that the package should be quick to learn and easy to use.

And despite all the extra sophistication that had been written into it, it was decided that the price should still be kept at the very low figure originally fixed.

So how does Mini Office operate?

Using the Word Processor is simplicity itself. There are none of the cryptic coded instructions that had to be mastered by people learning the early word processors.

You start by selecting the size of type you prefer – either normal or double-size. The latter is a feature that you cannot find on any other word processor.

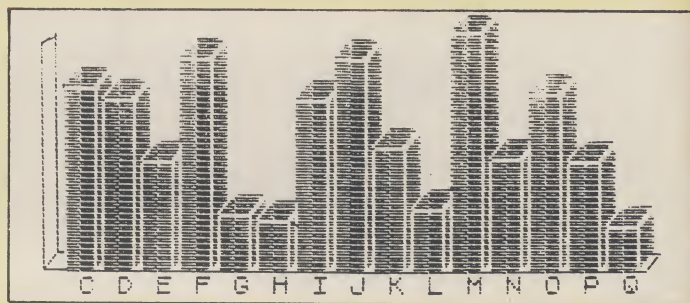
It is particularly suitable for

the first time they can send out a perfectly typed letter without outside help.

Primary school teachers are already making great use of the

information. It can be retrieved, in its entirety or just the parts you require for a particular purpose, whenever you need it.

The operation is so simple



Figures on the spreadsheet can produce a bar chart ...

double-size function, both on the screen and on hard copy printouts.

While you are using the word processor three useful pieces of information are displayed across the top of the screen.

They tell you how much time has elapsed since you started using it, the number of words you have written so far, and how many characters you can key in before the Spectrum's memory is full.

At any time you can press a key which tells you your typing speed. This is a most useful function, and can play an important part in increasing your efficiency at the keyboard.

You can also decide the size of the margin, the line length and the tab positions. Text can be copied from one part of the document to another.

At any time you can preview the text to see how it would look when printed out.

As with all the other programs in Mini Office, your work can be saved to tape and loaded when you want to use it again. It can also be printed out.

The Database program can be used to store a mass of

that a useful database can be created in minutes rather than days – and you certainly don't need any computer experience to set it up.

The search facility is very easy to use. You can search for a particular word or part of a word. Or you can order a numeric search – such as telling the computer to find all the numbers greater or less than the one you provide.

You can carry out multiple sorts. For instance, if you have built up a mailing list containing a list of names, addresses, telephone numbers, occupations and ages you can ask the database to provide you with a list of records in order of occupations and ages.

One powerful option allows you to replace anything on the database without having to go through the whole lot making amendments yourself.

You could, for instance, instruct it to find each reference to "teacher" and replace it with "lecturer".

The Spreadsheet is a new version of the program that marked an important milestone



in business computing – Visicalc.

It is often pointed out that this one program alone has helped to sell more personal computers than any other.

Certainly Visicalc and its derivatives have never been shaken from their position at the top of the list of best-selling business programs.

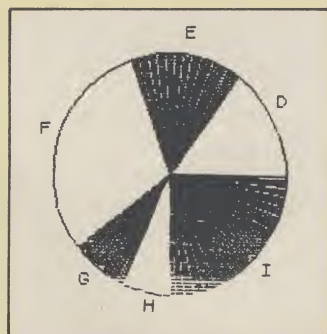
Yet the concept is very simple – a giant worksheet of rows and columns, only part of which can be seen on your screen at any one time. Into any position on the sheet you can put numbers, labels and mathematical formulae.

And when you alter any figure its effect ripples through the rest of the sheet, changing any totals as may be necessary.

The Mini Office version is ideal for home finance, providing you with an effortless means of keeping tabs on your income and expenditure – and enabling

you to work out your own budget.

In the Spreadsheet program – as well as in the Database – a sample file has been provided so



... or a pie chart

that you can experiment with it before entering your own data.

One feature that has been included that does not exist in any other spreadsheet is a warning device to prevent you accidentally erasing formulae – a very useful precaution.

The **Graphics** program uses the standard business graphics – line, bar and pie charts. This is something not always available on far more expensive spreadsheet packages.

The program uses data you have already prepared on the spreadsheet. You have to identify which set of information you require to see in graph form – such as by indicating which row or column – and then which of the graphs you require.

The graph is then automatically configured exactly as you require it. If you have a printer capable of producing graphics you can also print out

hard copies for a permanent record.

Because the original intention was to produce a package for people new to all these applications it is accompanied by a fully-detailed, easy to understand manual.

This 32 page free booklet gives clear instructions about how to use all four programs and in itself forms a concise introduction for first-time users.

If you want to start doing more with your Spectrum than just playing games, this package is your ideal introduction to the four most popular applications for professional computers.

Send for it today

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IT SOMETIMES happens that an item in this column rings a bell with many readers and triggers a flood of letters on the subject. My piece in *Sinclair User* November 1984 had that effect because it included a short section on SAVEing and LOADING headerless files on the Spectrum which interested a number of correspondents. I shall expand on the theme this month.

First, though, I must correct an error that crept in and was brought to my attention by Martin Carre of Guernsey, amongst others. It occurred in a table included in the piece which listed two machine code routines for SAVEing and LOADING the screen in a headerless file. The routines had been written as if the Spectrum display file and attributes file were together 6192 bytes long whereas they are in fact 6912 bytes. As a result the routines omitted to SAVE or LOAD the latter part of the attributes file. Apologies to all those who were lead astray. The correct version of the routines is given in Table 1.

Repeating the routines gives the op-

Headers examined

Andrew Hewson examines headerless files and block line deletion

the same values into 23311, 23312, 23314 and 23315 respectively.

The routine will be of use to Mike Hughes of Epsom who writes: **"I have written a cataloguing program which requires me to SAVE three character arrays but it is a nuisance waiting for each one to SAVE in turn and then pressing a key before the next SAVE. Is there any way of by-passing the 'start tape then press any key' message?"**

The best way of tackling the problem



Decimal	Assembler	Comment
167	AND A	Clear carry
62 255	LD A,255	Load A with 255
221 33 0 64	LD IX,16384	SAVE from 16384
17 0 27	LD DE,6912	Length 6912
205 194 4	CALL 1218	Call SAVE routine
201	RET	Return
55	SCF	Set carry
62 255	LD A,255	Load A with 255
221 33 0 64	LD IX,16384	LOAD at 16384
17 0 27	LD DE,6912	Length 6912
205 86 5	CALL 1366	Call LOAD routine
201	RET	Return

Table 1. Two Spectrum routines to SAVE and LOAD the screen display to and from a headerless file.

portunity to answer Warren Milburn of Ryton who asks: **"Please could you tell me how to alter the start address and bytes length in your routines for saving and loading headerless files?"**

The start address is passed to the routines in the ix register pair and the length is passed in the de register pair and so to adapt the routines to your own purposes you must alter the values passed. Assuming you know the start address and number of bytes that you wish to SAVE or LOAD and that the routines are stored consecutively in the printer buffer, then the procedure for LOADING is as follows:

POKE 23301, START-256*INT (START/256)
POKE 23302, INT (START/256)
POKE 23304, LENGTH-256*INT (LENGTH/256)
POKE 23305, INT (LENGTH/256)
To modify the SAVE routine POKE

would seem at first sight to be to SAVE the contents of the variables area as a CODE file. It is quite easy to calculate the starting address and length parameters required for the SAVE "" CODE command — the starting address would be the value held in the VARS system variable and the length would be the difference between VARS and the E_LINE system variable.

Decimal	Assembler	Comment
42 89 92	ld hl,(23641)	E_LINE to hl
43	dec hl	Backspace to byte containing 128
237 91 75 92	ld de,(23627)	VARS to de
167	and a	Clear carry flag
237 82	sbc hl,de	Calculate length of variables area
235	ex de,hl	Transfer length to de
66	ld b,d	Copy length to bc
75	ld c,e	
197	push bc	Save bc on the stack
221 42 75 92	ld ix,(23627)	VARS (ie address to SAVE from) to ix
62 255	ld a,255	Signal cassette main file
205 194 4	call 1218	Call ROM SAVE routine
193	pop bc	Retrieve length from stack
237 67 0 91	ld (23296), bc	Store length at beginning of buffer
201	ret	Return

Table 2. A Spectrum routine to SAVE the variables area as a headerless file.

The method would work well for SAVEing all variables but problems would occur on reLOADing because the starting address, length or arrangement of the variables area might have changed in between the two events. The starting address would have changed, for example, if a microdrive had been brought into use so that the microdrive maps occupied more space lower down in memory thereby causing the Basic program, variables and other items to be shuffled further up in RAM.

The length of the variables area would change if a new variable were brought into use or if a pre-existing array were reDIMensioned. The arrangement of the variables area would have changed if new data were written into a pre-existing string because the Spectrum handles this task by creating the string afresh at the top of the varia-

continued on page 190

continued from page 189

bles area before deleting the old version, which is generally lower down in memory.

Thus the reLOAded CODE file would often end up incorrectly placed in the Spectrum memory or in the correct place overwriting the wrong things.

The safest solution, which although not ideal ensures that the data that is reLOAded does not corrupt the program, is to SAVE the variables area using a short machine code routine as a headerless file. On reLOADing use another machine code routine to execute the following steps: 1 — delete all the current Basic variables using the ROM routine for recovering redundant memory; 2 — create a new variables area large enough to hold the incoming data using the ROM routine for creating space in memory; 3 — reLOAD the

ful because they look after all the relevant system variable pointers no matter whereabouts in memory that the space is to be deleted or created.

The delete routine can be used to deal with a problem raised by Jeff Sims of Wigan. He writes: **I sometimes wish to delete large chunks of an existing program in order to create a new version which shares some of the original subroutines. Is there a way of doing so which is more convenient than deleting each line?**

I have described a technique previously in this column for deleting large chunks of a Basic program by manipulating the hidden pointer which the machine places after each line number to tell it the length of the line. It is comparatively straightforward to POKE a new value into the pointer in the first line of the chunk to be deleted so that the machine thinks it is dealing

Decimal	Assembler	Comment
42 89 92	ld hl, (23641)	E_LINE to hl
43	dec hl	Backspace to byte containing 128
237 91 75 92	ld de, (23627)	VARS to de
205 229 25	call 6629	Call ROM routine to delete all variables
42 75 92	ld hl, (23627)	VARS to hl
237 75 0 91	ld bc, (23296)	New size for variables area to bc
205 85 22	call 5717	Call ROM routine to create space
55	scf	Set carry flag
62 255	ld a,255	Signal cassette main file
221 42 75 92	ld ix, (23627)	VARS to ix
237 91 0 91	ld de, (23296)	Length to de
205 86 5	call 1366	Call ROM routine to LOAD variables
201	ret	

Table 3. A Spectrum routine to delete all current variables and replace them with data from cassette.

variables using the routine for LOAD-ing headerless files.

Two routines to perform the tasks are listed in Tables 2 and 3 and as usual the decimal codes are listed so that readers without an assembler to hand can load the routines into the printer buffer using the decimal loader in Table 4.

The first routine is an adaptation of the SAVE routine in Table 1. Notice that the length of the variables area is saved in the printer buffer at address 23296 so that the load routine can reference the value when it is required. The user can also PRINT the value by invoking the routine using the PRINT USR command — because it is left in the bc register pair at the completion of the routine — so that the value can be noted for future reference.

The second routine makes two ROM calls. The first recovers the space lying between the addresses pointed to by the dep and hl register pairs thereby deleting all current variables. The second routine creates a space of length bc at the address pointed to by hl thereby creating room for the new variables. Those two ROM routines are very use-

ful with one monster line. The monster line can then be deleted in the conventional way by entering the line number.

The routine listed in Table 5 achieves the same end in a rather more elegant fashion. The user POKes the first and last line numbers of the section he wishes to delete into the first four bytes of the printer buffer as follows:

Decimal	Assembler	Comment
42 0 91	ld hl, (23296)	Fetch first line number
124	ld a,h	Return if both h
181	or l	and l registers
200	ret z	are zero
237 91 2 91	ld de, (23298)	Fetch second line number
122	ld a,d	Return if both d
179	or e	and e registers
200	ret z	are zero
213	push de	Save de on the stack
205 110 25	call 6510	Fetch address of first line into hl
227	ex (sp),hl	Store hl and recover de
35	inc hl	Increment number of second line
205 110 25	call 6510	Fetch address of end of second line
209	pop de	Recover first address
167	and a	Clear carry flag
237 82	sbh hl,de	Calculate length to be recovered
200	ret z	Return if zero
216	ret c	Return if negative
25	add hl,de	Rebuild address
205 229 25	call 6629	Recover space
201	ret	Return

Table 5. A Spectrum routine to delete all Basic lines lying between two line numbers passed to the routine in the printer buffer.

```
10 FOR I=23298 TO 23551
20 INPUT J
30 PRINT I,J
40 POKE I,J
50 NEXT I
```

Table 4. A simple decimal loader for POKE-ing machine code into the printer buffer starting at address 23298.

```
POKE 23296, LINE1-256*INT
(LINE1/256)
POKE 23297, INT (LINE1/256)
POKE 23298, LINE2-256*INT
(LINE2/256)
POKE 23299, INT (LINE2/256)
```

The routine checks each number in turn to ensure that it is non-zero and then calls the ROM routine at 6510 which returns, in the hl register, the address of the first of the two lines in RAM. It calls the same routine a second time to obtain the address of the byte following the end of the second line. The difference between the two addresses is checked to make sure that it is positive and if so the ROM routine at 6629 is called to recover the space thereby deleting the lines.

Finally I have been taken to task by Alex King of Bristol who writes: **Why do you persist in using decimal in your machine code listings when almost all other sources use hexadecimal?**

It is true that hexadecimal is the most common means of identifying numbers in assembly language programs but I feel that the majority of readers are not familiar with hex. Those who prefer hex are probably adept at conversions whereas the converse is not true — those who dislike hex probably find conversion confusing. Decimal is a compromise.

● Please address problems and queries to Andrew Hewson, Helpline, Graham Close, Blewbury, Oxfordshire.

Britain

Aylesbury Computer Club: 12 Long Plough, Aston Clinton, Aylesbury, Bucks.

Aylesbury ZX Computer Club: Ken Knight, 22 Mount Street, Aylesbury (5181 or 630867).

Basildon: Roundacre Microcomputer Users' Club. J Hazell, Basildon 285119/416333. Meetings every Wednesday 7.30 to 10.30pm.

Blackburn Computer Club: 1 Sutton Street, Feniscowles, Blackburn, Lancashire. Tel: B'burn 60033 (office hours) or 28127. Meets twice a month, subscription £5 (£3 juniors).

Bristol Yate and Sodbury Computer Club: 99 Woodchester Yate, Bristol, BS17 4TX.

Broughty Ferry Magic Micro Spectrum Users Club: Lindsay Darroch, 78 Marlee Road, Broughty Ferry (0382) 75459 or Fraser McGuire, 7 Kenaway Place, Broughty Ferry, Dundee (0382) 75821.

Cardiff ZX Club: Steve Smith (0222) 593237 or Mike Hayes (0222) 371732. Meets twice a month.

Colchester Sinclair User Group: Richard Lown, 102 Prettygate Road, Colchester CO3 4EE.

Computer Club International, 6 Drumdoon Walk, Downpatrick, N. Ireland BT30 6UF.

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EZUG-Educational ZX-80-81 Users' Group: Eric Deeson, Highgate School, Birmingham B12 9DS.

Furness Computer Club: R J C Wade, 67 Sands Road, Ulverston, Cumbria (Ulverston 55068). Meets every other Wednesday.

Glasgow ZX-80-81 Users' Club: Ian Watt, 107 Greenwood Road, Clarkston, Glasgow G76 7LW (041 638 1241).

Gloucester: Mid-weekly Spectrum User Group. Barry Ledbury, 8 Linnet Close, Gloucester GL4 9XA (0452) 23186.

Gravesend Computer Club: c/o The Extra Tuition Centre, 39 The Terrace, Gravesend, Kent DA12 2BA. Bi-monthly magazine and membership card.

Hassocks ZX Micro User Club, Sussex: Paul King (Hassocks 4530).

Hobbit Appreciation Society, 12 Middlefield Lane, Hinckley, Leicestershire LE10 0RB. Free newsletter with SAE.

Independent QL Users Group: Brian Pain, 24 Oxford Street, Stony Stratford, Milton Keynes MK11 1JU. Tel: 0908 564271. Publishes newsletter.

Inverclyde ZX-81 Users' Club: Robert Watt, 9 St. John's Road, Gourock, Renfrewshire PA19 1PL (Gourock 39967). Meets every other Monday at Greenock Society of the Deaf, Kelly Street, Greenock.

Keighley Computer Club: Colin Price, Redholt, Ingrow, Keighley (603133).

Lambeth Computer Club: Robert Baker, 32 Heatherington Road, London SW4 7NX.

Liverpool ZX Club: Meetings every Wednesday 7pm at Youth Activities Centre. Belmont Road, Liverpool 6. Keith Archer, 031-236 6109 (day-time).

Llanelli Computer Club: 40 Tan-Y-Bryn, Burry Port, Dyfed. Llanelli 56917.

Manchester Sinclair Users' Club: Meets every Wednesday, 7.30pm, at Longsight Library, 519 Stockport Road, Longsight — 061-225 6997 or 061 445 6316.

Meopham: National ZX Spectrum User Club. Guy Fullalove, Woodcotes, Camer Park, Meopham, Kent DA13 0XS. Bi-monthly newsletter, subscription £1.50. Send SAE for details.

Merseyside Co-op ZX Users' Group: Keith Driscoll, 53 Melville Road, Bootle, Merseyside L20 6NE; 051-922 3163.

Micro Users' Group: 316 Kingston Road, Ewell, Surrey KT19 0SY.

Mid-Kent Micro Club: Meets once monthly. Enquiries to M Gates, 65 Buckland Road, Maidstone ME16 0SH.

Mill Lane Association Computer Group: Bryan McAlley, 1 Cowleaze, Chinnor, Oxfordshire. (0844) 52426.

Newcastle (Staffs) Computer Club: Meetings at Newcastle Youth and Adult Centre, Thursday, 7.30. Enquiries to R G Martin (0782 62065).

North Hertfordshire Home Computer Club: R Crutchfield, 2 Durham Road, Stevenage; Meetings: first Friday of the month at the Settlement, Nevells Road, Letchworth.

Northern Ireland Sinclair Users' Club: P Gibson, 11 Fitzjames Park, Newtownards, Co Down BT23 4BU.

North London Hobby Computer Club: ZX users' group meets at North London Polytechnic, Holloway Road, London N7 Monday, 6pm.

Nottingham Microcomputer Club: ZX-80-81 users' group, G E Basford, 9 Holme Close, The Pastures, Woodborough, Nottingham.

Orpington Computer Club: Roger Pyatt, 23 Arundel Drive, Orpington, Kent (Orpington 20281).

Perth and District Amateur Computer Society: Alastair MacPherson, 154 Oakbank Road, Perth PH1 1HA (29633). Meetings: third Tuesday of each month at Hunters Lodge Motel, Bankfoot.

Regis Amateur Microcomputer Society: R H Wallis, 22 Mallard Crescent, Pagham, Bognor Regis, West Sussex PO21 4UU.

Roche Computer Club: 8 Victoria Road, Coop Rooms, Roche, Cornwall: 0726 890473. Twice weekly meetings, Monday and Friday.

Saltcoats Computer Club: Colin Borland, 117 High Road, Saltcoats, Ayrshire KA21 5SD. Weekly meetings.

Sinclair Postal User Group: 24 St. Mary's Way, Code SUL, Chigwell, Essex IG7 5BX. Produces magazine with competitions.

Scunthorpe ZX Club: C P Hazleton, 26 Rilestone Place, Bottesford, Scunthorpe; (0724 63466).

Sheffield: South Yorkshire Personal Computing Group. R Alderton (0742 20571), S Gray (0742 351440), P Sanderson (0742 351895).

Sinclair Amateur Radio User Group: SAE or two IRCs for details. Paul Newman G4 INP, 3 Red House Lane, Leiston, Suffolk IP16 4JZ.

Sittingbourne: Anurag Vidyarth (0795 73149).

St Albans: Bi-monthly meetings and a magazine. Details from Adam Slater, 40 Watford Road, St Albans, Herts AL1 2HA. (0727 54176).

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Sutton: Sutton Library Computer Club, D Wilkins, 22 Chestnut Court, Mulgrave Road, Sutton, Surrey SM2 6LR.

Washington Sinclair Users' Club, Columbia Community Centre, Tyne and Wear. Meets twice a month, tel. 4179483 or 4167367.

West Sussex: Midhurst and District Computer User Group. Enquiries to V Weston (073 081 3876), R Armes (073 081 3279).

Worle Computer Club: S W Rabone, 18 Castle Road, Worle, Weston-super-Mare BS22 9JW (Weston-super-Mare 513068).

Universal ZX Club: Postal club for Spectrum owners in the U.K. and abroad. C. Shaw, 1 Swiss Walk, Batley, W. Yorkshire.

ZX-Aid: Conrad Roe, 25 Cherry Tree Avenue, Walsall WS5 4LH. Please include sae. Meetings twice monthly.

Overseas

Australia: Australian ZX Users' Newsletter, incorporating QL User. Paul Janson, P.O. Box 397, Dapto 3530, Australia. Also seeks unpaid contributions for the newsletter.—W.A. ZX Users' Group, Garth Gregson, 34 Chester Street, South Fremantle 6162. Phone 3351671.

Austria: ZX User Club, Thomas Christian, c/o Wissenschaft Forscht e. V., Postfach 141, A1190 Vienna. Meets every first Friday of the month. Telephone 0222-44 32 050 for details.

Denmark: Danmarks National ZX-8081 Klub (DNZK), Jens Larson, Skovmosevej 6.4200 Slagelse, post giro 1 46 24 66.

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J Niels-Erik Hartmann, OZ-ZX-Radioamator, Bruger Gruppe, Bredgade 25 DK-4900, Nakskov.

Finland: ZX-kerho, c/o Kalevi Hamalainen, Siltakatu 9 A 8, 33100 Tampere 10, Finland. Phone 35831-34238. Publishes quarterly paper.

France: Club Micro-Europe, Chemin du Moulin 38, B-1328 OHAIN, Belgium (19/32/2/6332769 ou soir 19/32/2/6537468) or Paris-Micro, 19 rue de Tilly, 92700, Colombes, France; associated with Club Micro-Europe.

08 Informatique Clubs, 18 rue P Curie, 08000 Charleville-Mezieres, 24/572106; associated with Club Micro-Europe.

Yves Chapron, no. SUS-1047, Rue du Puy, La Terrasse, 38660 Le Touvet, France. Specifically for users in the Alps.

Germany: ZX Club, a postal club; contact Aribert Deckers, Postfach 967, D-7000 Stuttgart 1, West Germany.

Greece: Athens Spectrum Club, Paris Stamelos, Spetsou 2, isi22 Marousi, Athens, Greece.

Indonesia: Jakarta ZX-80/81 Users' Club, J S Wijaya, PO Box 20, Jkukg, Jakarta, Utara, Indonesia.

Irish Amateur Computer Club: Martin Stapleton, 48 Seacourt, Clontarf, Dublin 3. (331304).

Irish Sinclair Users Club: PO Box 1238, Dublin 1. Publishes a newsletter. Send SAE for details.

continued on page 192

continued from page 191

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Genova Sinclair Club; Vittorio Gioia, Via F Corridoni, 2-1, telephone 010 3125 51.

The Netherlands: Clive's Bits and Bytes, Paus Joannesstraat 32, 6235 CK Ulestraten. Telephone 043-644244.

Republic of Ireland: Irish ZX-8081 Users' Club, 73 Cnoc Crionain, Baile Atha, Cliath 1.

Singapore: Sinclair Users' Group: Charles Wong, 1005 Upper Bukit Timah Road, Singapore 2367.

South Africa: Amateur Spectrum Users' Club, PO Box 280, Winklespruit, Natal 4145. Steve Reinemo is interested in corresponding with users worldwide.

South African Sinclair Users' Club: PO Box 3923, Randburg 2125. Simon Lucas, chairman. Tel. (011) 704 2596.

Dumont and Syndercombe Amateur Computer Club. Jean-Pierre Dumont would like to correspond with ZX-81 owners via tapes. Write to 8 Kipling Road, Farrarmere, Benoni 1500, Transvaal.

ZX SA Club: Jonathan Jones, House 14, Anglo Alpha PO Box 15, 1725 Roodepoort.

Spain: Club Nacional de Usuarios del ZX-81, Joseph-Oriol Tomas, Avda. de Madrid, No 203 207, 10, 3a esc. A Barcelona-14 Espana. International ZX Spectrum Club: Gabriel Indalecio Cano, Sardana, 4 atrico 2a, San Andres de la Barca, Barcelona. Send international reply coupon. Produces a bi-monthly magazine. Spanish ZX Micro Club: Apartado 181, Alicante (Costa Blanca), Spain.

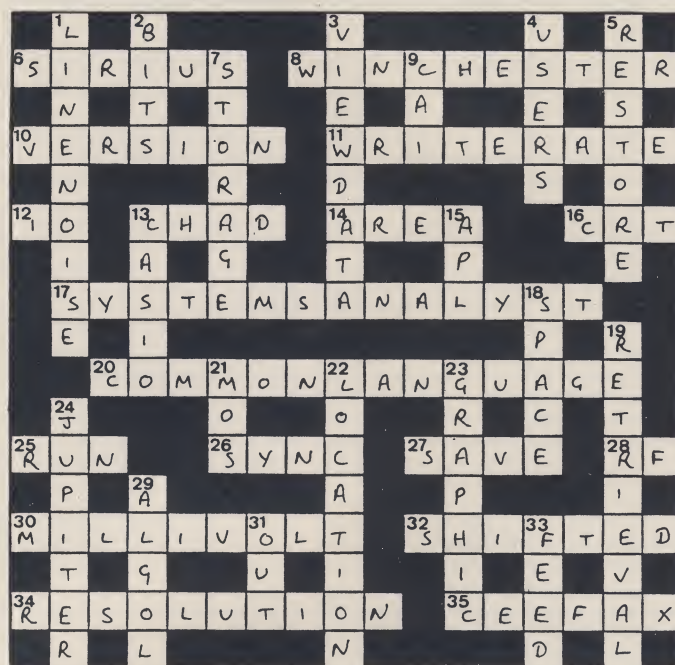
ZX Club Spain; C Benito PO Box 3253, Madrid, Spain.

Swedish ZX-club: Sinclair Datorklubben, Box 1007, S-122, 22 Enskede.

United States: Bay Area ZX-80 User Group, 2660 Las Aromas, Oakland CA94611.—Harvard Group, Bolton Road, Harvard MA 01451: (617 456 3967).—SAF Users' Group, 2749 Eden Road, Leslie, Michigan 49251.—ZX Users Group of New York, Box 560 Wall Street, New York, N.Y. USA 10005. Subscription \$15US, publishes international newsletter. Seeks newsletter exchange with other groups.

ZXWORD

SOLUTION



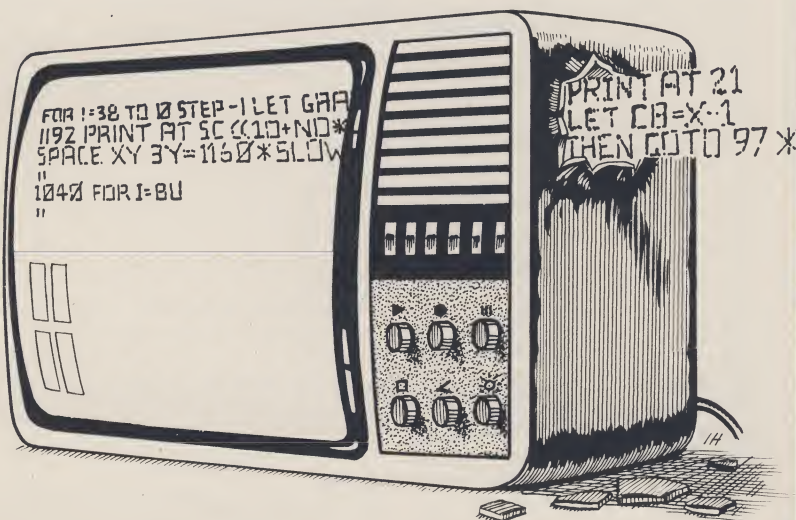
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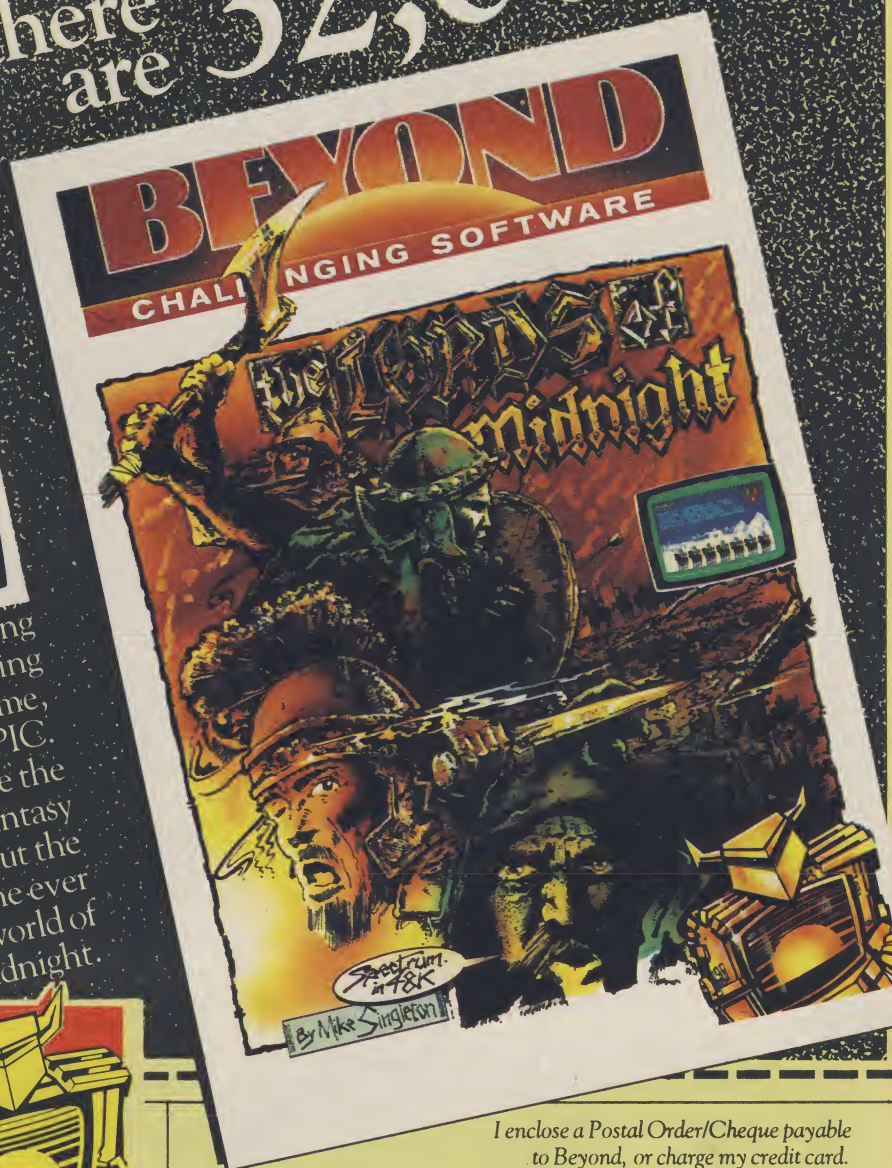
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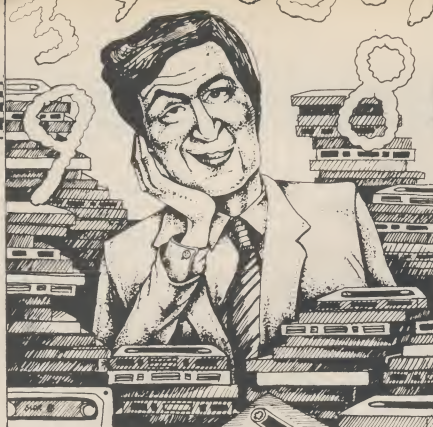
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If we have reviewed a program we have given it a rating known as the Gilbert Factor, named after our Software editor, John Gilbert. That factor includes clarity of instructions, speed of operation, ease of use, originality, lasting appeal, use made of graphics and sound, and success in accomplishing stated aims.

ZX-81

Adventure

Adventure	Bug-Byte	6
Adventure	Gavin Barker	6
Adventure 1	Abersoft	6
Black Crystal	Mastervision	7
Dungeons of Doom	Woosoft	*
Espionage Island	Artic	*
Greedy Gulch	Phipps	7
Inca Curse	Sinclair	*
Knight's Quest	Phipps	*
Lost Island	JRS	*
Magic Mountain	Phipps	*
Merchant of Venus	Crystal	7
Pharaoh's Tomb	Phipps	*
Pimania	Automata	6
Secret Valley	New Soft	*
Serpents Tomb	Vortex	*
Ship of Doom	Artic	7
The Great Western	New Soft	*
Time Bandits	New Soft	*
Tomb of Dracula	Felix	*
Trader Trilogy	Quicksilva	6
Volcanic Dungeon	Mastervision	5
World of Illusions	Contrast	4

Arcade

Alien Dropout	Silversoft	*
Asteroids	Silversoft	8
Asteroids	Software Farm	6
Astral Convoy	Vortex	*
Bank Robber	Romik	6
Bears in the Wood	Unicorn	6
Bubble Bugs	Romik	6
Byter	Protek	*
Cassette 1	Orwin	7
Cassette 2-5	Orwin	7
City Patrol	Sinclair	7
Damper	Quicksilva	7
Defenda	Quicksilva	8
Door Slammer	Cathedral	7
Forty-Niner	Software Farm	9
Froggy	DJL	7
Full-screen Breakout	New Generation	*
Galactic Trooper	Romik	6
Galaxians	Quicksilva	6
Galaxy Jailbreak	Romik	6
Games 2	JRS	*
Games Tape 1	J K Greye	*
Games Tape 2	J K Greye	*
Games Tape 3	J K Greye	*
Gamestape 1	Fawkes Computing	7
Glooper	Quicksilva	7
Gloops	Quicksilva	5
Gobbleman	Artic	*
Gobbler	Software Farm	*
Grand Prix	dk'tronics	*
Gulp 2	Campbell	*
Hang Glider	S Electronics	6
Hickstead	CCS	5
High-resolution Invaders	Odyssey	*
Invaders	Abersoft	*
Invaders	Bug-Byte	5
Invaders	Odyssey	8
Invaders	Selec	7
Invaders	Silversoft	*
Krazy Kong	PSS	*

M. Mouse goes de-bugging	Lothlorien	7
Maze Death Race	PSS	*
Maze Man	Abersoft	*
Mazogs	Bug-Byte	8
Micro Mouse	Lothlorien	7
Namtr Raiders	Artic	8
Night Gunner	Digital Integration	5
Puckman	Hewson	*
Rocket Man	Software Farm	7
Sabotage	Sinclair	6
Six Games	A Stubbs	5
Space Raiders	Sinclair	*
Space Rescue	D. Pinch	7
Space Trek	JRS	*
3D Monster Maze	New Generation	9
Three Games Cassette	McGraw Hill	8
Zuckman	DJL	8
ZX Invasion Force	Artic	*
ZX Panic	Selec	4
ZX-81 1K Games Pack	Crystal	9
ZX-81 Pocket Book	Phipps	*

Business

Accounts (Limited company)	Hestacrest	*
Accounts (Sole Trader)	Hestacrest	*
Business Bank Account	Transform	*
Critical Path Analysis	Hilderbay	6
Draft	Myrmidon	*
Mailing List	Hestacrest	*
Payroll	Hilderbay	*
Payroll	Soft Tech	*
Payroll	V&H Computing	*
Personal Banking System	Hilton	*
Purchase Ledger	Hestacrest	*
Sales Day Book	Transform	*
Sales Ledger	Hestacrest	*
Text	Contrast	8

Education

Binary Brains	Pooter	5
Calpac 1-2	Calpac	*
Four Rules of Number	Micro Master	*
Integration	University	8
Intermediate English 1-2	Rose	*
Intermediate Maths 1-2	Rose	*
Language Devel. Series	Glasson	*
Language Devel. Series	Micro Master	*
Linear Programming	University	7
Matrix Operations	University	*
O Level Chemistry	Calpac	*
O Level French Revision	Rose	*
O Level Maths Revision	Rose	*
Polynomials	University	*
Primary Arithmetic	Rose	*
Regression	University	*
Self-teach Program	Anvil	*

Language

Forth	Sinclair	7
ZX Forth	Artic	8

Practical

Ephemeris	Bridge	7
Football Pools	Hartland	*
Poolster	Naigram	3

Puzzle

Nowotnik Puzzle	Phipps	*
Word Fit	Ram Writer	6

Simulation

Flight Simulation	Sinclair	6
Pilot	Hewson	7
Print Shop	CCS	*

Strategy

Airline	CCS	7
Auto Chef	CCS	7
Battleships	JRS	*
Conflict	Martech	7
Cyborg Wars	Stratagem	7
Dallas	CCS	6
Dictator	Bug-Byte	7
Farmer	CCS	*
Fighter Pilot	Digital Integration	5
Football Manager	Addictive Games	7
Fort Apache	Contrast	8
Galaxy Conflict	Martech	8
Great Britain Ltd	Hessel	*
Ocean Trader	Quicksilva	7
Pioneer Trail	Quicksilva	7
Racehorse Trainer	G Barker	6

Software Directory

Traditional

Do Not Pass Go	Work Force	*
Lynchmob	Bridge	6
Original Superchess	CP Software	*
Tai	PSS	*
Tenpin	Phipps	*
ZX 1K Chess	Artic	*
ZX Compendium	Mastervision	7
ZX-Chess 1	Artic	*

Utility

Graphics	IPA	*
Graphics Toolkit	JRS	9
HI Resolution	CRL	6
Machine Code Test Tool	OCP	*
MCoder	PSS	8
Programme Enhancement		
Package	R and R	*
Renumber Delete	Work Force	*
Trace	Texgate	7
ZX Compiler	Silversoft	*
ZX Screenkit	Picturesque	*
ZX-81 Remload	Picturesque	*
ZX-Bug	Artic	*
ZX-sideprint	Microsphere	*
ZXAS	Bug-Byte	*
ZXDB	Bug-Byte	*

SPECTRUM 16K

Adventure

Android One	Vortex	*
Escape	New Generation	8
Mines of Saturn/Return to Earth	Mikro-Gen	*
Moria	Severn	*
Planet of Death	Artic	6
Secret Valley	New Soft	*
The Great Western	New Soft	*
Time Bandits	New Soft	*

Arcade

Aquarius	Bug-Byte	6
Arcadia	Beau Jolly	5
Arcadian	J K Greye	6
Assassin	Spectrasoft	*
Avenger	Abacus	5
Baron	Temptation	*
Base Invaders	Imagination	*
Black Hole	Quest	6
Blind Alley	Sunshine	7
Bug Blaster	Crystal	*
Cassette A	Orwin	*
Caterpillar	CDS	*
Cavern Fighter	Bug-Byte	4
Centi-Bug	dk'tronics	*
Children's Compendium	Dymond	*
City Defence	Mikro-Gen	*
Colour Clash	Romik	4
Cookie	Ultimate	*
Cosmic Guerilla	Crystal	8
Crazy Cranes	Voyager	5
Creepy Crawler	Mikro-Gen	*
Crevasse and Hotfoot	Microsphere	7
Cruising	Sunshine	4
Cyber Rats	Silversoft	7
Death Chase	Micromega	6
Demolition	Comp. Rentals	*
Destroyer	Winters	*
Di-lithium Lift	Hewson	3
Digger Dan	Ocean	*
Doombugs	Work Force	8
Dymonoids	Dymond	*
Earth Defence	Artic	5
Ed-On	Add-On	4
Eskimo Eddie	Ocean	*
Family Games Pack	Hornby	*
Fireflash	Abacus	5
Froggy	DJL	7
Fruit Machine	dk'tronics	6
Galactians	dk'tronics	*
Galactic Trooper	Romik	3
Galactic Warriors	Abacus	6
Galaxians	Artic	6
Ghost Hunt	PSS	*
Gnasher	Mastertronic	4
Gobble-a-Ghost	CDS	*

continued on page 196

Gobbleman	Artic	*	Education One	Lerm	*	Super Play I	Video	*
Godzilla and Martians	Temptation	7	Educational	Startersoft	*	Tennis	Winters	*
Ground Attack	Silversoft	6	Firework Music	Soft Cottage	8	Utility		
Gulpman	Campbell	*	First Numbers	Collins	*	Aspect	Bug-Byte	5
Haunted Hedges	Micromega	6	40 Education Games	Granada	*	Audio Sonics	Work Force	4
Hopper	PSS	6	Four Rules of Number	Micro Master	*	Auto Sonics	Buttercraft	5
Horace and the Spiders	Sinclair	8	French Voc Test	Tutorial	*	Basic Utilities	Jaysoft	6
Horace Goes Skiing	Sinclair	8	Hidden Letters	Poppy	*	Character Generator	Spectrasoft	*
Hungry Horace	Sinclair	8	Hot Dot Spotter	Longman	*	Dietron	Custom	6
Invasion Force	Artic	8	Integration	University	8	Disassembler	dk'tronics	7
It's the Wooluf	Crystal	5	Intermediate English 1-2	Rose	*	Display	Work Force	*
Jet Pac	Ultimate	8	Know Your Tables	Collins	*	Editor/Assembler	Picturesque	8
Labyrinth	Axis	4	Language Devel. Series	Glasson	*	Extended Basic	CP Software	7
Leap Frog	CDS	*	Language Devel. Series	Micro Master	*	FP Compiler	Softek	9
Light Cycle	PSS	*	Learn Basic	Logic 3	*	Friendly Face	Monitor	7
Luna Crabs	Micromega	7	Learning Read 1	Poppy	*	Keysounder	S and G	*
Magic Meanies	CDS	2	Linear Programming	University	*	Letterfont	Allanson	8
Maze Chase	Hewson	8	Marks Book	Lerm	*	Machine Code Test Tool	OCF	7
Meteor Storm	Quicksilva	7	Maths Invaders	Stell	*	Master Toolkit	OCF	7
Meteoroids	dk'tronics	7	Maths Tutor	AD Software	7	MCoder	PSS	8
Meteoroids	Softek	6	Matrix Operations	University	*	Micropen	Contrast	*
Micro Mouse	Lothlorien	6	Money	Poppy	*	Print Utilities	Sinclair	7
Millypede	Add-on	7	Night Sky	Bridge	*	Programmer's Dream	Work Force	8
Mined Out	Quicksilva	7	O Level Maths	Homestudy	*	Renumber Delete	Work Force	*
Moon Buggy	Visions	6	O Level Physics	Homestudy	*	Slow Loader	ELR	9
Mr Wong's Loopy Laundry	Artic	6	Paddington's Shopping Mix-			Sound FX	dk'tronics	6
Muncher	Silversoft	6	up	Collins	*	Spec. Bug	Artic	*
Nanas	Mikro-Gen	*	Pathfinder	Widget	*	Spec. Editor/Assembler	Picturesque	8
Orbiter	Silversoft	7	Polynomials	University	8	Spec. Monitor	Picturesque	7
Ostron	Softek	*	Pre/early school cassettes	Essex	*	Spectrum Super Toolkit	Nectarine	8
Pengy	Micromania	4	Primary Arithmetic	Rose	*	Spectsound	PDQ	2
Pitman Seven	Visions	*	Punctuation Pete	Heinemann	8	Supercode	CP	8
Planetoids	Sinclair	8	Regression	University	*	Taswide-64	Tasman	*
Proteus	Abacus	5	Self-teach Program	Anvil	*	Trace	Texgate	8
Rapedes	Visions	*	Shape Sorter	Widget	*	TT-S	Timedata	8
Repulsar	Softek	*	Special Agent	Heinemann	*	ZX Spectrum Assembler	McGraw Hill	4
Rider	Virgin	6	Spellbin	Startersoft	8	ZXED	dk'tronics	*
Road Toad	dk'tronics	7	Use and Learn	Microl				
Robot Panic	Soft Mill	1						
Sam Spade	Silversoft	5	Language					
Santa	Artic	*	Beta Basic	Betasoft	9	SPECTRUM 48K		
Sentinel	Abacus	7	Practical			Adventure		
Shark Attack	Romik	5	Biorythms	Spectrasoft	*	Abyss	CCS	6
Sheer Panic	Visions	7	Countries of the World	Hewson	8	Ace in the Hole	Add-on	*
Slippery Sid	Silversoft	8	Cycle Planner	Medidata	4	Adventure 1	Abersoft	6
Space Fighter	Winters	*	Map of the UK	Kuma	7	Adventure Island	Contrast	*
Space Intruders	Quicksilva	7	Shopping List	SD	*	Alchemist	Beau Jolly	7
Space Lanes	Cathedral	*	Spectasort	Spectadraw	4	Arcane Quest	Add-on	*
Space Raiders	Sinclair	6	Puzzle			Atlas Assignment	Virgin	7
Space Zombies	Mikro-Gen	*	Flippit	Sinclair	7	Black Crystal	Mastervision	7
Spec. Frogs/ Showdown	Artic	*	Hanoi King	Contrast	7	Black Dwarf's Lair	New Soft	*
Spec. Gobbleman	Artic	*	Lojix	Virgin	3	Black Planet	Phipps	7
Spec. Invaders	Artic	*	Nowotnik Puzzle	Phipps	7	Buffer Adventure	Buffer Micro	6
Spec. Invasion Force	Artic	7	Quazar	Rose	4	Byte	CCS	3
Spec. Scramble	Work Force	5	Simulation			Castle	Bug-Byte	*
Spectipede	Mastertronic	8	Air Traffic Controller	Hewson	6	Castle Blackstar	SCR	7
Spectral Invaders	Bug-Byte	5	Airliner	Protek	6	Circus	Channel 8	8
Spectral Panic	Hewson	6	Golf	R & R	7	Classic Adventure	Melbourne House	*
Spectres	Bug-Byte	4	Golf	Virgin	7	Colditz	Phipps	8
Strike Four	Spectresoft	7	NightFlite	Hewson	5	Colossal Caves	CP Software	8
Styx	Bug-Byte	8	Print Shop	CCS	8	Cry Wolf!	Add-on	*
Sub	Romik	3	Pro-Golf	Hornby	7	Demon Lord	MCE	5
Tank Battle	dk'tronics	9	Strategy			Detective	Arcade	7
3D Monster Chase	Romik	4	Auto Chef	CCS	*	Devils of Deep	Shepherd	*
Train Game	Microsphere	5	Big Match Soccer	Winters	*	Diamond Quest	CCS	4
Trom	dk'tronics	6	Dallas	CCS	6	Diamond Trail	Gilsoft	7
Vortex	JK Greye	*	Dictator	dk'tronics	*	Dragonsbane	Quicksilva	6
Winged Warlord	CDS	7	Farmer	CCS	*	Dungeon Master	Crystal Comp.	8
Wizard's Warriors	Abersoft	*	Football	CCS	*	Dungeons of Doom	Temptation	3
Yomp	Virgin	9	Heathrow	Winters	*	Espionage Island	Artic	5
Business			Las Vegas	Hewson	8	Everest Ascent	Sheperd	6
Finance Manager	OCF	*	Quincy	Temptation	*	Eye of Bain	Artic	7
Home Computer Pack	SD Micro	*	Traditional	Severn	*	Fantasia Diamond	Hewson	7
Masterfile 16	Campbell	*	Backgammon			Frog Face	Positive Image	7
Matcalc	Work Force	*	Bridge Tutor	Hewson	8	Golden Apple	Artic	7
Micropen	Contrast	7	Bridgemaster	CP Software	*	Gorgon	Phipps	*
Vu-Calc	Sinclair	8	Challenge	Serin	9	Halls of Things	Crystal Comp.	9
Vu-File	Sinclair	*	Gambling Tape	Temptation	*	Hampstead	Melbourne House	8
Education			Las Vegas	Dymond	*	Here comes the sun	Alligata	7
Alphabet	Widget	*	Odds-on	Temptation	5	Hobbit	Melbourne House	9
Alphabet Games	Sinclair	*	Othello	RSD	*	Hole	Add-on	*
Apostrophe	Sinclair	7	Pinball	CP Software	*	Horror Atoll	Add-on	*
Ballooning	Heinemann	*	Pool	Winters	*	Inca Curse	Artic	6
Calpac 1-3	Calpac	*	Reversi	Bug-Byte	7	Inferno	Shepherd	7
Car Journey	Heinemann	*	Roulette	Sinclair	8	Invincible Island	Shepherd	8
Cargo	Sinclair	7	Solo Whist	Newsoft	*	Island	Crystal	4
Chess Tutor	Artic	*	Spec. Microchess	Video Soft.	*	Jericho Road	Virgin	7
Counting	Starter Soft	*		Artic	*	Jungle Adventure	Shards	7
Counting	Widget	*					CCS	4

Kentilla	Micromega	6	Cyber Zone	Crystal	*	Tomatoes	Visions	6
Knight's Quest	Phipps	6	Daley Thompson's	Ocean	8	Rider	Virgin	6
Leopard Lord	Add-on	4	Decathlon	Creative Sparks	8	River Rescue	Creative Sparks	3
Lords of Midnight	Beyond	9	Dangermouse in Double	Artic	7	Robot Riot	Silversoft	6
Lords of Time	Level Nine	8	Trouble	Interstella	2	Rommels Revenge	Crystal	8
Lost Over Bermuda	Add-on	*	Death Chess 5000	Mikro-Gen	*	Sabre Wulf	Ultimate	8
Mad Martha	Mikro-Gen	7	Defenda	Incentive	6	Scuba Dive	Durrell	9
Mad Martha II	Mikro-Gen	*	Deffendar	K-Tel	3	Security Shelter	Add-on	*
Mountains of Ket	Incentive	7	Defusion	Microcosm	*	Skull	Games Machine	5
Murder at Manor	Gemtime	8	Defusion/Worms	Mansfield	4	Snowball	Level 9	9
Mysterious Fairground	Buffer Micro	6	Demon	Automata	9	Sorcery	Virgin	7
Odyssey of Hope	Martech	6	Demon Chase	Mastertronic	7	Space Station Zebra	Beyond	6
Oracle's Cave	Doric	8	Deus Ex Machina	Artic	8	Spectron	Virgin	6
Orb	Comp. Rentals	*	Devil Rides In	Postern	4	Spellbound	Beyond	7
Orc Slayer	Gamma Software	5	Dimension Destructors	Phoenix	7	Splat	Incentive	8
Paradox	Runesoft	2	Dinky Digger	Virgin	6	Stagecoach	Creative Sparks	7
Perseus and Andromeda	Channel 8	7	Dodge City	Cheetahssoft	5	Stop the Express	Sinclair	8
Peter Pan	Hodder &		Dr Franky and the Monster	Sinclair	3	Strangeloop	Virgin	9
	Stoughton	6	Dragonfire	PSS	*	Submarine Strike	Pulsonic	6
Pimania	Automata	7	Driller Tanks	Elm	3	Tank Trax	Mastertronic	3
Quest	Hewson	7	Elektro Storm	Sinclair	6	Terrahawks	CRL	5
Quetzalcoatl	Virgin	8	Energy 30,000	Ocean	7	The Guardian	PSS	6
Roundsby Incident	Add-on	*	Eric and the Floaters	Quicksilva	6	The Pyramid	Fantasy	7
Satan's Pendulum	Minatron	7	Eskimo Eddie	NTD Software	5	The Snowman	Quicksilva	8
Sherlock	Melbourne House	9	Frank N Stein	Sunshine	4	3D Bat Attack	Cheetahssoft	6
Ship of Doom	Artic	7	Fred	Positive Image	6	3D Lunattack	Hewson	6
Solaris	Softel	*	Freez Beez	CRL	6	3D Seiddab Attack	Hewson	5
Spoof	Runesoft	7	Froot Loop	Artic	5	3D Star Wars	Add-on	1
Superspy	Shepherd	5	Galaxy Attack	Pulsonic	6	3D Tank Duel	Real Time	6
System 15000	Craig		Ghost Rider	CCS	4	3D Tunnel	New Generation	9
	Communications	9	Gilligan's Gold	Work Force	9	Tiler Tim	Microwish	6
Temple of Vran	Incentive	8	Glug Glug	Phipps	5	Time Gate	Quicksilva	8
Terror from The Deep	Add-on	*	H. Dumpty and the F.	Hewson	6	Timebomb	CDS	7
The Final Mission	Incentive	7	Wuzzies	Elite	6	Tobor	Add-on	7
Time Quest	Mikro-Gen	*	Harry Goes Home	Micromania	5	Tornado Low Level	Vortex	8
Titanic	R&R	5	Hickstead	Abxex	8	Tranz Am	Ultimate	*
Transylvanian Tower	Shepherd	7	High Noon	PSS	*	Trashman	New Generation	8
Twin Kingdom Valley	Bug-Byte	8	House of Living Dead	Quicksilva	8	Travel with Trashman	New Generation	7
Urban Upstart	Shepherd	*	Hunchback	Mikro-Gen	6	Traxx	Quicksilva	7
Valhalla	Legend	7	Invasion Body Snatch.	Contrast	*	Tribble Trubble	Software Projects	8
Vampire Village	Terminal	4	Jack and the Beanstalk	PSS	6	Trom	dk'tronics	4
Velnor's Lair	Quicksilva	8	Jackpot	Phipps	6	Tutankhamun	Micromania	8
Volcanic Dungeon	Mastervision	6	Jet Set Willy	Ultimate	8	Two-Gun Turtle	Lothlorien	7
War of the Worlds	CRL	4	Killer Knight	Bug-Byte	9	Warlock of Firetop	Penguin	*
Width of the World	Mosaic	4	Knight Rider	Salamander	7	Mountain	Microsphere	7
Ziggurat of Dread	Add-on	*	Kokotoni Wilf	PSS	*	Wheelie	Pulsonic	2
			Kosmic Kanga	Worse Things Happen at Sea	7	Worm Attack	Silversoft	7
Arcade			Krakatoa	Wrath of Magra	8	Xadom	Mastervision	8
Ad Astra	Gargoyle Games	8	Krazy Kong	Xig-Zag	6	Zig-Zag	Quicksilva	4
Adven. of a St Bernard	Mastertronic	7	Laser Zone	Zipper Flipper	7	Zombie Zombie	Quicksilva	7
Alcatraz Harry	Mastertronic	3	Laserwarp					
Android Two	Vortex	*	Last Sunset Lattica					
Ant Attack	Quicksilva	8	Lazatron					
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Base Invaders	Work Force	6	Mission Impossible					
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Beach Head	US Gold	8	Monkey Biznes					
Bear Bover	Artic	8	Moon Alert					
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Black Hawk	Creative Sparks	7	Mummy Mummy					
Blade Alley	PSS	6	Munnery's Mergatroids					
Blue Thunder	Foundry Systems	6	Night Gunner					
Brain Damage	Silversoft	*	1994					
Bubble Buster	Sinclair	5	Olympimania					
Bubble Trouble	Arcade	*	Orion					
Bugaboo	Quicksilva	7	Pat the Postman					
Butterfly	Pulsonic	4	Pedro					
Buzz Off	Electric	5	Penetrator					
Caesar the Cat	Mirrorsoft	7	Pi-Balled					
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Cavelon	Ocean	7	Psi-Spy					
Centipoid Plus 3	Orwin	5	Pssst					
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Codename Mat	Micromega	9	Reactor					
Corridors of Genon	New Generation	9	Rescue					
Cruise Attack	Mikro-Gen	*	Rescue					
Crusoe	Automata	5	Revenge of the Killer					

continued on page 198

Software Directory

Spectext
Spreadsheet
Stock Control
Stock Control
Stock Control
Tasword
Tasword II
Utility File
Word Processor
Word Processor

Education

ABC Liftoff
Angle
Angle Turner
Astro Maths
Blockbuster
Castle
Castle of Dreams
Castle Spellerous
Chess Tutor 1
Cortez
Countabout
Dyslexia Beater
Eiffel Tower
Electronic Learner's Guide
No. 1
French is Fun
French Mistress
French Voc Test
German is Fun
German Master
Guitar Tutor 1
Guitar Tutor 2
Handwriting
Highway Code
Hotline
Humpty Dumpty
Inkosi
Jungle Jumble
Jungle Maths
Learn to Read 1-5
Letters and Numbers
Linkword
Look Sharp
Magnets
Make-a-Chip
Mansfield Park
Mathskills II
MDA-PCSS
Model Maths
Mr T's Measuring Games
Mr. Men
Musicmaster
Nineteenth C. England
O Level Chemistry
O Level Physics
Party Time
Pathfinder
Pirate
Quick Thinking
Sequences
Spanish Gold
Speak and Spell
Speech Marks
Spelling Bee
Star Reader
Startrucker
Teacher Data
Tense French
Time Traveller
Tuner
Whizz Kid
Wizard Box
Words and Pictures
Zoo

Language

Forth
Forth
48/80 Forth

Hisoft C
Logo
Micro Prolog
Pascal Compiler
Snail Logo
Spec. Forth
Spec. Forth
ZX Forth

McGraw Hill
Microl
Hilderbay
Kemp
Transform
Tasman
Tasman
SD Micro
Microl
Quicksilva

Longman
Chalksoft
Arnold Wheaton
Scisoft
Compusound
L'Ensembleiada
Widgit
Sinclair
Sinclair
L'Ensembleiada
Longman
Dunitz
Chalksoft

ETST
CDS
Kosmos
Tutorial
CDS
Kosmos
Harlequin
Harlequin
Chalksoft
Learning Systems
Chalksoft
Widget
Chalksoft
Clever Cloggs
Scisoft
Sinclair
Jimjams
Silversoft
Mirrorsoft
Sinclair
Sinclair
Sussex
Griffin
MDA Assoc.
Jive
Ebury
Mirror
Sinclair
Sussex
Calpac
Think Tank
C. Tutor
Widget
Chalksoft
Mirrorsoft
Chalksoft
Chalksoft
S and G
Sinclair
Image Systems
Scisoft
Widget
B Farris
Sulis
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Soft Cottage
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Scisoft
Chalksoft
L'Ensembleiada

Melbourne House
Sinclair
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Robotics
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Hi-Soft
CP
Abersoft
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Diet Master
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How Long have you got?
I Ching
I Ching
Personal Reminder
Spectadraw 2
Star Gazer
The Complete Guide to
Medicine
Vega-Table
World Info

Puzzle

Arcturus
Computaword
Flix
Hanoi King
Hareraiser
Jumbly
Mazecube
Stuart Henry's Pop Quiz
3D Strategy

Simulation

Ashes
Combat Lynx
Cricket Captain
Fighter Pilot
Flight Simulation
Full Throttle
Golf
Golf
Hareraiser
Howzat
Inkos
Match Point
New Birkdale
Olympics
Royal Birkdale
Strike Attack
Super Soccer
Test Match
The Forest
Troon
United
World Cup Football

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Angler
Apocalypse
Battle 1917
Battle of Britain
Brewery
British Lowland
Caribbean Trader
Conflict
Conquest
Dix Mille
Fall of Rome
Football Manager
Galaxy Conflict
Gangsters
Gatecrasher
General Election
Golf
Great Britain Ltd
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New Venture
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Oligopoly
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Diet Master
Keysoft
Spectrasoft
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Salamander
Sirius
SD Micro
McAlley
CRL
Eastmead
Vega
Wimsoft

Visions
Work Force
Softtricks
Contrast
Haresoft
dk'tronics
PAL
Bellflower
Quicksilva

Pulsonic
Durrell
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Digital Integration
Sinclair
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dk'tronics
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Haresoft
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Chalksoft
Sinclair
Hornby
CRL
Ocean
Micromart
Winters
Comp. Rentals
Phipps
Hornby
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Artic

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Red Shift
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Martech
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Quicksilva
Bug-Byte
Virgin
Hessel
Protek
K-Tel
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Melbourne House
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CCS
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Lothlorien
MW Gamesworld
Manor

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Warlord
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Wilfred the Hair

Traditional

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Bridge Master
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Do Not Pass Go
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Evolution
Go To Jail
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Original Superschess
Pontoon
Ramopoly
Roulette
Scrabble
Snooker
Super Bridge
Superschess II
Superschess III
The Turk
Voice Chess
Yahtzi
Yatzee
ZX Draughts
ZX Reversi
ZX-Chess II

Utility

Allsort S-1
Assembler
Beyond Basic
Building Price
Cartoon Animation
Character Generator
Compiler
Composer
DLAN
FP Compiler
Games Designer
HURG
Keyword Extension
Linked Software:
Information Handling
List File
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Melbourne Draw
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Softalk 1-2
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Spectre Mac/Mon
Spectrosim
Spectrum Extended Basic
Spectrum Monitor
Spectrum Sprites
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Supercode II
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Lothlorien
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WDS
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Lothlorien
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Software Publishers

A & F Software, Unit 8, Canalside Industrial Estate, Woodbine Street East, Rochdale, Lancashire OL16 5LB

Abacus Software, 21 Union Street, Ramsbottom, Nr Bury, Lancashire

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ADS, 8 Bronchurch Street, Portsmouth, Hampshire PO4 8RY

Allanson Computing, 77 Chorley Road, Adlington, Chorley, Lancashire PR6 9LH

Alligata Software, 1 Orange Street, Sheffield S1 4DW

APS, 1 Golden Square, London W1

Arcade Software, Technology House, 32 Chislehurst Road, Orpington, Kent BR6 0DG

Arnold Wheaton, Parkside Lane, Dewsbury Road, Leeds LS11 5TD

Artic Computing, Main Street, Brandesburton, Driffield YO25 8RG

Automata UK, 27 Highland Road, Portsmouth, Hampshire PO4 9DA

Axis, 71 Brookfield Avenue, Loughborough, Leicestershire LE11 3LN

Beau-Jolly, 19A New Broadway, Ealing, London W5

Bellflower Software, 6 Rosewood Avenue, Greenford, Middlesex UB6 7QP

Betasoft, 92 Oxford Road, Moseley, Birmingham B13 9SQ

Beyond Software, 8 Herbal Hill, London EC1

Bridge Software, 36 Fernwood, Marple Bridge, Stockport, Cheshire SK6 5BE

Bridgemaster, Sandymouth, Beeches Road, Farnham Common, Buckinghamshire SL2 3PS

Buffer Micro, 310 Streatham High Road, London SW16

Bug-Byte, Mulberry House, Canning Place, Liverpool L1 8JB

Calpac Computer Software, 108 Hermitage Woods Crescent, St Johns, Woking, Surrey

Campbell Systems, 57 Trap's Hill, Loughton, Essex IG10 1TD

CCS, 14 Langton Way, Blackheath, London SE3 7TL

CDS Micro Systems, Silver House, Silver Street, Doncaster, South Yorkshire DN1 1HL

Century Communications, Portland House, 12-13 Greek Street, London W1V 5LE

Chalksoft, 37 Willowslea Road, Northwick, Worcester

Channel 8, 51 Fishgate, Preston, Lancashire PR1 8BH

Cheetahsoft, 24 Ray Street, London EC1R 3DJ

Clever Clogs, Argus Press Software Group, 1 Golden Square, London W1R 3AB

Collins, 18/20 Stephenson Way, North Gower Street, London NW1 2DX

Compusound, 32/33 Langley Close, Redditch, Worcester B98 0ET

Computatutor, 3 Thalia Close, Greenwich, London SE10 9NA

Contrast Software, Warren Road, Liss, Hampshire GU33 7DD

Cornhill Software, 2 Penrith Way, Aylesbury, Buckinghamshire HP21 7JZ

CP Software, 1 Glebe Road, Uxbridge, Middlesex UB8 2RD

Craig Communications, PO Box 46, Basingstoke, Hampshire

Creative Sparks, Thomson House, 296 Farnborough Road, Farnborough, Hampshire

CRL, 9 King's Yard, Carpenters Road, London E15 2HD

Cross Software, 36 Langford Crescent, Barnet, Hertfordshire EN4 9EH

Crystal Computing, 2 Ashton Way, East Herrington, Sunderland SR3 3RX

CSP Systems, 213 Stainbeck Road, Leeds

D Pinch, 72 Norwood Crescent, Coldbrook, Barry, South Glamorgan

Digital Integration, Watchmoor Trade Centre, Watchmoor Road, Camberley, Surrey GU15 3AJ

DJL, 9 Tweed Close, Swindon, Wiltshire SN2 3PU

dk'tronics, Unit 6, Shire Hill Ind Est, Saffron Walden, Essex CB11 3A

Domark, 228 Munster Road, London SW6

Dorcas Software, 3 The Oasis, Glenfield, Leicester

Doric Computer Services, 3 The Oasis, Glenfield, Leicester LE3 8QS

Dunitz, 154 Camden High Street, London NW1 0NE

Durrell Software, Castle Lodge, Castle Green, Taunton TA1 4AB

Dymond Software, 22 Hospital Road, Annan, Dumfriesshire DG12 5HP

Dynavision Production Studio, PO Box 96, Luton LU3 2JP

East London Robotics, St Nicholas House, The Mount, Guildford, Surrey GU2 5HN

Eastmead, Eastmead House, Lion Way, Camberley, Surrey GU16 5EZ
Ebury Press, Humphrey Bull & Barker, 62 Dean Street, London W1V 5HG

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Gamma Software, 12 Milverton Road, London NW6 7AS

Gargoyle Games, 4 North Western Arcade, Birmingham BS 5LH

Gavin Barker, 12 Feming Field, Shotton Colliery, County Durham DH6 2JF

Gemini Software, 18a Littleham Road, Exmouth, Devon EX8 2QG

Gemtime Software Division, 16 Ben Ledi Road, Kirkcaldy, Fife KY2 5RP

Gilsoft, 30 Hawthorn Road, Barry, South Glamorgan, South Wales

Gouldstone, 45 Burleigh Avenue, Wallington, Surrey SM6 7UG

Granada Publishing, 8 Grafton Street, London W1X 3LA

Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS

Griffin & George, Frederick Street, Birmingham B1 3HT

Haresoft, PO Box 365, London NW1

Harlequin Software, 43 Osprey Park, Thornbury, Bristol BS12 1LY

Harland Software, 32 Ivor Place, London NW1 6DA

Heath Computing, 7 The Meadows, Flackwell Heath, Buckinghamshire HP10 9LX

Heinemann Computer Education, 22 Bedford Square, London WC1B 3HH

Hessel, 15 Lythan Court, Cadwell Crescent, Sunningdale, Berkshire

Hestacrest, PO Box 19, Leighton Buzzard, Bedfordshire LU7 0DG

Hewson Consultants, 56B Milton Trading Estate, Milton, Abingdon

Hilderbay, 8/10 Parkway, Regents Park, London NW1 7AA

Hilton Computer Services, 14 Avalon Road, Orpington, Kent

Hisoft, 180 High Street, Dunstable, Bedfordshire LU6 1AT

Hodder & Stoughton, PO Box 6, Dunton Green, Sevenoaks, Kent TN13 2XX

Homestudy Ltd, Treleigh Woods Farm, Treleigh, Redruth, Cornwall TR16 4AW

Hornby Software, 21 Penfold Hill, Leeds LS15 0PW

Image Systems, 34 Lynwood Drive, Worcester Park, Surrey KT4 7AB

Incentive, 54 London Street, Reading, Berkshire RG1 4SQ

Inform Software, 3 Treesdale Close, Birkdale, Southport PR8 2EL

Interstella Software, 82 New Forest Drive, Brockenhurst, Kent

ISP Marketing Ltd, Crown Hill, 38B High Street, Godalming, Surrey GU7 1DZ

JK Greye Software, 16 Park Street, Bath, Avon BA1 2TE

JRS Software, 19 Wayside Avenue, Worthing, Sussex BN13 3JH

K-Tel International (UK), 60 Western Avenue, London W3 0TU

Kemp, 43 Muswell Hill, London N10 3PN

Keysoft, 6 Bruce Grove, Tottenham, London N17

Kosmos Software, 1 Pilgrims Close, Harlington, Dunstable, Bedfordshire LU5 6LX

Kuma Computers, 12 Horseshoe Park, Pangbourne, Berkshire RG8 7JW

Learning Systems, 11 Warwick Court, Princes Drive, Harrow, Middx HA1 4UB

Legend, PO Box 435, London E4 7LX

Lerm, 10 Brunswick Gardens, Corby, Northamptonshire

Level Nine, 229 Hugenden Road, High Wycombe, Buckinghamshire HP13 5PG

Logic 3, Unit 18, Wye Ind Est, London Road, High Wycombe, Buckinghamshire

Longman, Longman Group, Longman House, Harlow, Essex CM20 2JE

Lothlorien, 56a Park Lane, Poynton, Stockport, Cheshire SK12 1RE

Manor Software, 24 Manor Gardens, London SW20

Martech Games, 9 Billingham Road, Eastbourne, East Sussex BN20 8LY

Mastertronic, (as for Mastervision)

Mastervision, Park Lorne, 111 Park Road, London NW8 7SL

McAlley, 1 Cowleaze, Chinnor, Oxfordshire OX9 4TD

McGraw Hill, Shoppen Hangers Road, Maidenhead, Berkshire

Medidata, PO Box 26, London NW9 9BW

Melbourne House, Castle Yard House, Castle Yard, Richmond TW10 6TF

Metacomco, 26 Portland Square, Bristol BS2 8RZ

continued on page 200

Software Directory

continued from page 199

Micro Dealer UK, Unit 6, Marlborough Road Trading Estate, Lattimore Road, St Albans, Hertfordshire
Micro Wish, PO Box 15, Colne, Lancashire BB8 9DB
Microbyte, 19 Worcester Close, Lichfield, Staffordshire
Microcosm, 68 The Glade, Clayhall, Ilford
Micromania, 14 Lower Hill Road, Epsom, Surrey KT19 8LT
Micromega, 230/236 Lavender Hill, London SW11
Microsphere, 72 Roseberry Road, London N10 2LA
Mikro-Gen, 44 The Broadway, Bracknell, Berkshire RG12 1AG
Minatron Computing, 34 Pinewood Close, Westbury on Trym, Bristol BS9 4AJ
Mirrorsoft, PO Box 50, Bromley, Kent BR2 9TT
Monitor Software, PO Box 442, London NW7 2JF
Mosaic, 187 Upper Street, London N1 1RQ
MW Gamesworld, 12 Lawnswood Avenue, Chasetown, Walsall WS7 8YD
Myrmidon Software, PO Box 2, Tadworth, Surrey KT20 7LU
Naigram Software, c/o Soho Synth House, 18A Soho Square, London W1V 5FB
Nectarine, 837 Yeovil Road, Slough SL1 4JH
New Generation Software, FREEPOST, Bath BA2 4TD
Newsoft, 12 White Broom Road, Hemel Hempstead, Hertfordshire
NTD Software, 19 Radipole Road, London SW6
Oasis Software, 9a Alexandra Parade, Weston-Super-Mare, Avon BS23 1QT
Ocean Software, 6 Central Street, Manchester M2 5NS
OCP, 4A High Street, Chalfont St Peter, Buckinghamshire SL9 9QB
Orwin Software, 26 Brownlow Road, Willesden, London NW10 9QL
Penguin, 536 King's Road, London SW10
Phipps Associates, 172 Kingston Road, Ewell, Surrey
Phoenix Publishing, 14 Vernon Road, Bushey, Hertfordshire WD2 2JL
Picturesque, 6 Corkscrew Hill, West Wickham, Kent BR4 9BB
Pooter Games, 24 Parsloes Avenue, Dagenham RM9 5NX
Poppysoft, The Close, Common Road, Headley, Newbury, Berkshire
Positive Image Software, 129 Dumbarton Road, Glasgow
Postern Software, PO Box 2, Anderovers Ford, Cheltenham, Gloucester GL54 5SW
Print 'n' Plotter Products, 19 Borough High Street, London SE1 9SE
Protek Computing, 1a Young Square, Brucefield Ind Park, Livingston, West Lothian
PSS, 452 Stoney Stanton Road, Coventry CV6 JDG
Pulsonic, Warwick Distribution Ltd, 3 Standard Road, Park Royal, London NW10 6EX
Quest International Computer Systems, Gillingham House, 38-44 Gillingham Street, London SW1
Quicksilver, Palmerstone Park House, Southampton, Hampshire SO1 1LL
R and R, 34 Burton Road, Gloucester GL4 0LE
RAM Writer, 3 Vumba House, 2 Cedar Gardens, Sutton, Surrey
Ramtop Services, 5 Rue D'Artois, 75008, Paris, France
Red Shift, 12c Manor Road, Stoke Newington, London N16 5SA
Romantic Robot, 113 Melrose Avenue, London NW2 4LX
Romik Software, 272 Argyll Avenue, Slough SL1 4HE
Rose Software, 148 Widney Lane, Solihull, West Midlands
Runesoft, Charnwood House, Crossgate Drive, Nottingham NG2 1LW
Salamander Software, 27 Ditchling Rise, Brighton, East Sussex BN1 4QL
Scisoft, 5 Minster Gardens, Newthorpe, Eastwood, Nottingham NG16 2AT
SCR Adventures, 190 Shelbourne Road, Tottenham, London
SD Microsystems, 9 Cadwell Court, Hitchin, Hertfordshire SG4 0AQ
Selec Software, 37 Councillor Lane, Cheadle, Cheshire
Serim Software, Freeport, Dept SU7, PO Box 163, Slough, Berkshire SL2 3YY
Shards, Suite G, Roycraft House, 15 Linton Road, Barking, Essex
Shepherd Software, Elm House, 23-25 Elmshott Lane, Chippenham, Slough, Berkshire
Shiva Publishing, 64 Welsh Row, Nantwich, Cheshire CW5 5BR
Silversoft, London House, 271/273 King Street, London W6 9LZ
Sinclair Research, 6 Kings Parade, Cambridge
Soft Cottage, 19 Westfield Drive, Loughborough, Leicestershire LE11 3QJ
Soft Tech, 31 Lampits, Hoddesdon, Hertfordshire
Softek International, 12/13 Henrietta Street, Covent Garden, London WC2E 8LH
Softel, 5 Durward Drive, Glenrothes, Fife KY6 2LB
Software Farm, 155 White Ladies Road, Clifton, Bristol BS8 2RG
Software Projects, Bear Brand Complex, Allerton Road, Woolton, Liverpool, Merseyside L25 7SE

Spartan CC, 29 Feltham Avenue, East Moseley, Surrey KT8 9BJ
Spectadraw, 1 Cowleaze, Chinnor, Oxfordshire OX9 4TD
Spectrasoft, Capital House, Market Place, London W3 6AL
Startersoft, 32 Parkfields, Chippenham, Wiltshire
Stell Software, 36 Limefield Avenue, Whalley, Lancashire BB6 9RJ
Stratagem Cybernetics, 286 Corbin Place, 2E, Brooklyn, New York 11235
Sulis Software, 4 Church Street, Abbey Green, Bath BA1 1FP
Sunshine Books, 12/13 Newport Street, London WC2
Sussex Publication, Townsend Poulshot, Devizes, Wiltshire SN10 1SD
Tasman Software, 17 Hartley Crescent, Leeds LS6 2LL
Temptation Software, 27 Cinque Ports Street, Rye, East Sussex
Terminal Software, Derby House, Derby Street, Bury BL9 0NW
Texgate, 14 Brook Lane, Corfe Mullen, Wimbourne, Dorset
Think Tank, 35 Wellington Road, Wimbledon Park, London SW19
Thor Computer Software, Erskine Industrial Estate, Liverpool L6 1AP
Timedata, 16 Hemmells High Road, Laindon, Basildon, Essex SS15 6ED
Transform, 41 Keats House, Porchester Mead, Beckenham, Kent
Tutorial Software, 'Vilands', Glasllwch Lane, Newport, Gwent NP1 3PS
Ultimate Play the Game, The Green, Ashby de la Zouche, Leicestershire LE6 5JU
Unicorn Micro Systems, 312 Charminster Road, Bournemouth BH8 9RT
University Software, 29 St Peters Street, London N1
US Gold, Unit 24, Tipton Trading Estate, Bloomfield Road, Tipton, West Midlands DY4 9AH
Vega Space Systems, 28 Watford Road, St Albans AL1 2AJ
Virgin Games, 2-4 Vernon Yard, London W11
Visions, 1 Feldgate Mews, Studlands Street, London W6
Vortex Software, 280 Brooklands Road, Brooklands, Manchester M23 9HD
Widget Software, 48 Durham Road, London N2 9DT
Wilcox Software, Station Road, Walsall WS7 6JZ
Winters, 24 Swannington Close, Cantley, Doncaster, South Yorkshire
Woosoft, 5 Andrews Close, Robertsbridge, Sussex TN32 5PB
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Sinclair spares and repairs

IF, LIKE MANY other Spectrum owners, you find one day that your computer has died, you will have a major problem on your hands. Phoning the Sinclair Research customer relations department in Camberley will not help very much either.

If your electronics knowledge is limited, then you will decide to send your Spectrum to one of the companies who specialise in repairing computers. If you have a good working knowledge of electronics then the addresses listed

below should enable you to obtain most replacement parts to repair your computer. Some of the simpler repairs, such as those involving keyboards can be undertaken by those with limited knowledge.

If your computer is under guarantee then it is important that you do not invalidate that guarantee. Talk to the customer service division at

Sinclair Research and they will tell you where to send it. When returning the computer put a note in describing the fault as briefly as possible, as this will speed the repair process.



Suppliers of Sinclair parts:

Adaptors and Eliminators, 14 Thames Street, Louth, Lincolnshire. (050782) 8011. Spectrum and ZX-81 power supplies.

ASTECH (UK), 16 Albury Close, Reading, Berkshire. (0734) 53067. Supplies modulators for all countries PAL, NTSC, SECAM.

CPC, 194-200 North Road, Preston, Lancashire. (0772) 555034. Supplies all parts for Spectrum, ZX-81, ZX printer, ZX RAM pack including all case parts, power supplies and keyboard parts. Probably the best place to get ULA, ROM, case parts and keyboard.

Ferranti Semiconductors, Computer Road, Hollinwood Avenue, Oldham, Lancashire. (061) 682 6844, (061) 624 0515/6661. Supplies Spectrum and ZX-81 ULA.

Maplin Electronics, Southend on Sea, Essex. (0702) 552961. Supplies general components and data and technical books.

National Semiconductors (UK) Ltd, 301 Harpur Centre, Horne Lane, Bedford. (0234) 47147. Supplies Spectrum RAM/74LS series TTL; LM 1889 video chip.

NEC (UK) Ltd, Block 3, Carfin Industrial Estate, Motherwell. (0698) 73221. Supplies Spectrum ROM and RAM/74LS TTL; Z80A.

Sinclair Research Ltd, Camberley, Surrey. (0276) 685311.

Texas Instruments, Manton Lane, Bedford, Bedfordshire. (0234) 223000, (0234) 211655. Supplies RAM 4116, 4532, 4164, 74LS TTL (Spectrum).

Timex Corporation, Camperdown Plant, Harrison Road, Dundee, Tayside. (0382) 819211. Makers of Spectrum, ZX-81, Printer, Interface one, Microdrives, RAM Pack. Repair and service for Sinclair.

Verran (Computerfix), Units 2H & 2J, Albany Park, Frimley Road, Camberley, Surrey. (0276) 66266. Repairs Spectrums and ZX-81.

Zilog (UK) Ltd, Zilog House, 45-53 Moorbridge Road, Maidenhead, Berkshire. (0628) 39200. Supplies Z80A.

Component companies

SOME OF THE large companies mentioned above do not like dealing directly with the public. The following is a list of component companies which should be happy to deal with you. Most will have catalogues available and will supply data sheets for their products on demand.

These firms are only distributors and they do not make components. If you have a problem with a particular device contact the manufacturer as listed above because not many of the distributors can answer technical questions; RS Components, Farnell, Ambitt and Hawkes may do. Anyone needing NEC parts should phone them direct and ask for some distributors dealing with them.

Abacus Electronics, Kennet House, Pembroke Road, Reading, Berkshire. (0734) 33311. Makes dealt with: National Semiconductors, SGS.

Access Electronic Components Ltd, Austin House, Bridge Street, Hitchin, Hertfordshire. (0462) 57244. Makes dealt with: National Semiconductors.

Alpha Electronic Components Ltd, 66 Wilbury Way, Hitchin, Hertfordshire. (0462) 57244. Makes dealt with: National Semiconductors.

AM Lock Distribution Ltd, Nevill Street, Middleton Road, Oldham, Lancashire. (061) 652 0431. Makes dealt with: Motorola, Mostek.

Anzac Components Ltd, Burnham Lane, Slough, Buckinghamshire. (06286) 4701. Makes dealt with: Hitachi.

Axon Electronics Ltd, Unit F, Turnpike Road, Cressex Industrial Estate, High Wycombe, Buckinghamshire. (0494) 442181. Makes dealt with: Motorola.

BA Electronics Ltd, Millbrook Road, Yate, Bristol. (0454) 315824. Makes dealt with: Texas Instruments.

Celdis Ltd, 37-39 Loverock Road, Reading, Berkshire. (0734) 585171. Makes dealt with: Motorola, Mostek.

Crellon Electronics Ltd, 380 Bath Road, Slough, Berkshire. (06286) 4434. Makes dealt with: Motorola, SGS, Zilog.

Dialogue Distribution Ltd, Watchmore Road, Camberley, Surrey. (0276) 682001. Makes dealt with: Hitachi.

DTV Group, 10-12 Earnest Avenue, West Norwood, London SE27. (01) 670 6166. Makes dealt with: National Semiconductors.

Farnell Electronic Components Ltd, Canal Road, Leeds. (0532) 636311. Makes dealt with: Hitachi, National Semiconductors.

Hawke Electronics Ltd, Amotex House, 45 Hanworth Road, Sunbury on Thames, Middlesex. (01) 979 7799. Makes dealt with: Motorola, Texas Instruments. Will answer technical queries.

Hill Electronics (NI) Ltd, 290 Antrim Road, Belfast, Northern Ireland. Makes dealt with: Mostek.

ITT Multicomponents, Edinburgh Way, Harlow, Essex. (0279) 442971. Makes dealt with: Motorola, National Semiconductors, SGS, Texas Instruments and Hitachi.

Macro Marketing Ltd, Burnham Lane, Slough, Berkshire. (06286) 4422. Makes dealt with: Motorola, National Semiconductors, Zilog, Texas Instruments.

Quarndon Electronics Ltd, Slack Lane, Derby. (0332) 32651. Makes dealt with: Texas Instruments.

STC Electronics, Edinburgh Way, Harlow, Essex. (0279) 26777. Makes dealt with: Motorola, National Semiconductors, SGS, Texas Instruments and Hitachi.

Computer parts

Z80A: Zilog, SGS, NEC (Spectrum/ZX-81).

ULA: Ferranti (Spectrum/ZX-81).

ROM: Hitachi, NEC (Spectrum), Mostek, Motorola (ZX-81).

RAM: 4116 type — NEC, National Semiconductors, Texas Instruments, ITT (Spectrum). 4532 type — Texas Instruments, OKI (Manhattan Skyline) (Spectrum). 2114 type — Motorola, NEC (ZX-81). 4118 type — Mostek (ZX-81). 2K type — Mostek, Toshiba, Motorola, Texas Instruments, NEC (ZX-81).

LM1889: ICI — National Semiconductors (Spectrum).

TTL: 74LS00/74LS32/74LS157 — Texas Instruments, SGS, Motorola, National Semiconductors, NEC.

The following are all used on the 48K Spectrum.

Regulator: LM7805 +5V Reg. — SGS, NEC, Texas Instruments, Motorola.

Crystals, Capacitors, Resistors, Diodes, Sockets: available through general component suppliers.

Modulator: UM1233 Astec (UK) Ltd.

Leads: available at most TV/electrical shops.

Case parts: Sendale Plastics.

Keyboard: CPC.

**HOW TO SAVE
£££'s
ON THE COST OF
SOFTWARE
AND HARDWARE
'ADD-ONS'**



LOGIC3

**BUMPER
20 PAGE ISSUE
CHRISTMAS COMPETITION!**

LOGIC 3

Spectrum Club

BRITAIN'S No.1 SOFTWARE CLUB
WINTER ISSUE 1984/85

WIN A MICRODRIVE

Christmas Competition

1st prize: ZX Microdrive & ZX Interface 1 (worth over £70)

2nd prize: Currah µSpeech Synthesizer (worth £29.90)

10 runner up prizes of free games software (each worth over £10)

To Celebrate the Christmas season Logic 3 are running a grand Christmas Competition with a ZX Microdrive and Currah µSpeech Synthesizer as first and second prizes.

The ZX Microdrive, complete with Interface 1, is undoubtedly the ultimate Spectrum add-on allowing programs and data to be quickly saved and recalled. The Currah µSpeech is both powerful, featuring an infinite vocabulary, and easy to use.

To enter the competition carefully read the reviews in this catalogue then answer the questions in the Quiz and mail your answers to Logic 3. All entries received before 31st January will be eligible for the competition. Prizes will be awarded to the first 12 correct entries drawn.

Here's your chance to win these desirable Spectrum add-ons, but don't leave it too late, make sure, your entry reaches Logic 3 before the closing date!



CLUB SUCCESS

The Logic 3 Spectrum Club was launched in July, 1984 and has been an outstanding success. Already more than half-way to its target of 10,000 members in twelve months, the continuous growth of the club has kept Logic 3's staff working seven days a week just to keep up with demand.

Tony Toller, Logic 3's managing director and coordinator of the Club, explains its success as follows: "With other clubs once a person has joined there is no more reason for the club to try to support its members who each month have to purchase a certain number of products from a short list. Our Club is different. Members have no obligation to purchase any products

from the club so the pressure is on us to choose only the best quality products and offer the best possible prices. We also take a lot of pride in publishing independent reviews on all the products we carry and if we do not like something about a product we are not afraid to say so."

Tony Toller's policy of offering Club members a real service rather than just running "yet another mail order business" is winning new members all the time. But size by itself is not the main objective "as we grow so we will be able to improve our service to members still further and perhaps, one day, develop the club catalogue into a proper magazine." With the Christmas edition of the catalogue already running at a bumper 20 pages containing reviews of more than 180 products that day may come quite soon!

INSIDE

★ EDUCATION

A selection of the most effective educational programs available. Designed for children from the age of 4 to 16.

★ GAMES

The best games for the Spectrum selected by our own review panel and rated according to: graphics, sound, colour, originality and interest.

★ PROGRAMMING

The 'Learn BASIC' tutorials really show you how to write structured programs in easy to understand stages.

★ UTILITIES

Design your own games.

★ HARDWARE

Some good deals in hardware and peripherals.

Spectrum Club

The Logic 3 Spectrum Club has something for everyone: regular reviews, excellent savings on all the latest top quality games and educational software, and discounts on hardware.

NEW MEMBERS INTRODUCTORY OFFER

Join Logic 3 Spectrum Club within 60 days and benefit from our new members introductory offer to purchase our "Software Specials" at a huge discount.

MEMBERSHIP IS ONLY £3.00 PER YEAR
(Equivalent to only 25p per month)

TO JOIN FILL IN YOUR NAME AND ADDRESS ON THE ORDER FORM (OR ON A SEPARATE SHEET OF PAPER) AND SEND WITH YOUR £3.00 TO THE ADDRESS BELOW.

MEMBERSHIP DEPT.
THE LOGIC 3 SPECTRUM CLUB
MOUNTBATTEN HOUSE
VICTORIA STREET
PERKINS

LOGIC 3's SOFTWARE PANEL

Neil Atkinson, pupil of Borlase School, spent weekends in a shop selling computer software, in work as a journalist.

Andrew Goltz, director spent 6 years with Commodore UK and International, instigated Commodore 'Approved Product' third party software.

Bliss Healey, graduate of School of Economics translated business French, currently working on design of graphic software.

Tony Toller, director former journalist business applications and co-ordinator software club.

ic Attack



Machine:
48k
Joystick:
Kempston and
most others—
redefineable keys
Category:
Arcade
Adventure
Publisher:
Ultimate

BONUS
£3.45
PRICE

Price: £5.50 Club price: £4.95

During your quest for The Golden Key of ACG you become trapped in an evil haunted castle. As you wander around the castle's ancient rooms and passages you encounter Frankenstein, Dracula and the Devil himself! As you move from room to room you try to ward off the ghouls and pick up any items which may be of use later. A fast moving 'graphics only' adventure.

Ratings: /10
Graphics: 7
Sound: 6
Colour: 7
Originality: 9
Interest: 7
Order code: ATIAT

Deus Ex Machina



Machine:
48k
Joystick:
No
Category:
Strategy
Publisher:
Automata

Price: £15.00 Club price: £13.50

The prospect of an all star cast performing in stereo sound, synchronised with a computer game and coming from a software house of such standing as Automata was pretty exciting. Perhaps that was the problem. With a lot of software there is such a build up that the product has to be incredible to live up to it all. Deus Ex Machina turned out to be a bit disappointing, but we've included it in our catalogue because it's a 'first' and it's uniqueness makes it a must for collectors.

To play the game properly you need a tape recorder (preferably stereo hi-fi) as well as your normal Spectrum kit. You load the program and play the audio tape, then there's a countdown routine to enable you to synchronise the start.

The basic theme is the story of life and its struggles. You start as a seed in the womb, progress to becoming and embryo, through birth, life and on into old age. The computer side consists of a number of arcade-style games where you're constantly having to fight off the problems of life, even to the end where you try to stop your blood cells clotting. The audio tape tells the story and accompanies most of the games with songs.

The soundtrack would do credit to a West End musical, the computer games are average—there's no score so you can't tell how you're doing. Different? Yes. Interesting? Yes, if you're a Psychologist!

Ratings: /10
Graphics: 7
Sound: 10
Colour: 5
Originality: 10
Interest: 6
Order code: DEM

Doomsday Castle



Machine:
48k
Joystick:
Kempston
Fuller
Sinclair
Cursor
Category:
Arcade/
Adventure
Publisher:
Fantasy

Price: £6.50 Club price: £4.95

Another high quality arcade adventure from Fantasy. You explore an enormous castle, consisting of no less than 255 labyrinths connected by 49 passages. Get to the corridors by blasting through the doors, whilst avoiding the extraordinary aliens. Recharge your lasers by shocking the aliens.

Ratings: /10
Originality: 9

original game of lasting interest.

Ratings: /10
Graphics: 7
Sound: 7
Colour: 7
Originality: 8
Interest: 7
Order code: DOOCA

Jet Set Willy



Machine:
48k
Joystick:
Kempston
AGF
Protek
Interface II
Category:
Arcade
Publisher:
Software Projects

BONUS
£3.45
PRICE

Price: £5.95 Club price: £4.55

At last! The long awaited sequel to 'Manic Miner'. The saga continues... Miner Willy has gone from rags to riches. Guide Willy around his cliff-top mansion, as he searches for all the bottles and glasses after a party, before his housemaid, Maria, will let him crash out in bed. Check the beach, down the road, and on the rooftop.

Over 70 screens, amazing graphics and humour add up to make this one of the best for the Spectrum.
Ratings: /10
Graphics: 8
Sound: 7
Colour: 7
Originality: 9
Interest: 8
Order code: JETSE

Jokers Wild



Machine:
48k
Joystick:
No
Category:
Arcade/Adventure
Publisher:
Phoenix Software

BONUS
£3.45
PRICE

Price: £6.99 Club price: £5.60

A high quality value for money package—two games for the price of one. One game is arcade style, the other adventure.

Your mission is to defeat your enemies who are travelling the universe disguised as magicians. This year, the fair which they travel with has been set up on earth. Here they have been hypnotising unsuspecting earthlings, who are then led into 'bunko-booths' where they are robbed of their souls. The enemy's main power lies in a pack of hypnotic cards, which you must try to capture, first in the arcade game, then in the adventure. Before you can play the adventure, you have to reach at least level 4 of the arcade game. From here on, on completion of each level further clues for use in the adventure are given. For those of you whose arcade or adventure playing skill is not quite up to scratch there is a useful 'Panic-Packet', which contains useful clues to help your game play. Good value.

Ratings: /10
Graphics: 6
Sound: 5
Colour: 7
Originality: 8
Interest: 7
Order code: JOKWI

Manic Miner



Machine:
48k
Joystick:
Kempston AGF
Protek Interface II
Category:
Arcade/Adventure
Publisher:
Software Projects

BONUS
£3.45
PRICE

Price: £5.95 Club price: £4.55

Willy the Miner has fallen down a disused mine shaft. He works his way through the various levels collecting keys and searching for secret treasure. Manic Miner is a classic arcade game for the Spectrum—There are 20 caverns to penetrate, each requiring its own bit of ingenuity to ensure success. A classic game that set the standards others are judged by.

Ratings: /10
Graphics: 8
Sound: 7
Colour: 9
Originality: 9
Interest: 9
Order code: MANSP

Mugsy



Machine:
48k
Joystick:
No
Category:
Strategy
Publisher:
Melbourne House

BONUS
£4.95
PRICE

Price: £6.95 Club price: £5.55

From the publishers of the top selling adventure—the Hobbitt—comes their newest release, MUGSY. The game can best be described as a comic strip featuring animated characters. As Mugsy, you must organise your gang and their dealings—such as protection rackets and the purchase of weapons and ammunition, and most important of all make sure that your gang stays on top. Muscle in on the action!

Ratings: /10
Graphics: 9
Sound: 9
Colour: 8
Originality: 10
Interest: 9
Order code: MUGSY

Sabre Wulf



Machine:
48k
Joystick:
Kempston
Cursor
Sinclair
Interface II
Category:
Arcade/Adventure
Publisher: Ultimate

BONUS
£6.95
PRICE

Price: £9.95 Club price: £8.45

From the publishers of Spectrum classics such as Atic Atac and Lunar Jetman now comes SABRE WULF, an arcade/adventure epic set in the deepest jungle. The deeper you explore, risking life and limb, the more challenges you face: hippos, rhinos, warthogs, tarantulas, bats and at least 30

LOGIC3

...ude, temperature,
...weapon and navigation
...3D game featuring
...realistic graphics.
...ed.

Originality: 9
Interest: 8
Order code: COMLY

Thompson's athlon



Machine:
48k
Joystick:
Kempston
Sinclair
Category:
Arcade
Publisher:
Ocean

BONUS
£4.95
PRICE

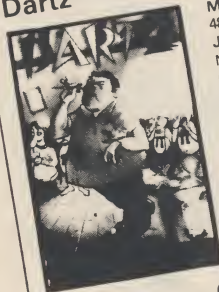
Club price: £5.85

...ce: £6.90
...mpeting against the computer
...are Daley Thompson, facing
...gruelling events.
...the first day you can choose to
...compete in the 100 metres, long
...mp, shot-put, high jump and 400
...metres. The second day's events
...the 110 metres hurdles, discus,
...pole-vault, and the 1500 metres.
...the running events you animate
...Daley by either pressing two keys
...alternately, or rapidly moving the
...joystick from side to side. In the
...hurdles you press the fire button to
...jump. The throwing events require
...a little more skill and timing and
...a little less finger stamina!! In the
...long jump, after a good run up try
...to get a take-off angle as near to
...45 degrees as possible. In the high
...jump, judge your take-off and the
...right time to fall, without knocking
...off the bar. In the pole-vault get
...the pole as close to 90 degrees as
...you can and plant it in the right
...place. In the javelin and discus
...work up a really powerful throw
...and remember to release it on
...time! There is a comprehensive on
...screen score board showing world
...records, qualifying times, etc.
...the graphics and animation are
...good and keyboard play is very
...responsive. Novel touches, like the
...officials coming out and measuring
...long jumps, the crowd cheering,
...and Daley scratching his head or
...leaping around, add to the
...enjoyment of a good game.

Ratings: /10
Graphics: 8
Sound: 7
Colour: 8

Originality: 6
Interest: 9
Order code: DALSP

Dartz



Machine:
48k
Joystick:
No
Category:
Simulation
Publisher:
Automata

Price: £5.00

Club price: £4.00

At last—a good simulation of darts
for your home computer. Aim
carefully at the board but take into
account the number of pints
you've had tonight, and the crowd

LOGIC3

...leat them. This is a
...il new adventure from
...nd the elaborate
...ons of the many locations
...llent once again. From
...ic encounters with
...1, through the bustle of a
...Market town to the future,
...nd beyond to the future,
...ne is a must for history
...nd frustrated time-travellers

Order code: LOTSP

Mania



Machine:
48k
Joystick:
No
Category:
Adventure
Publisher:
Automata

BONUS
£4.95
PRICE

Club price: £7.50

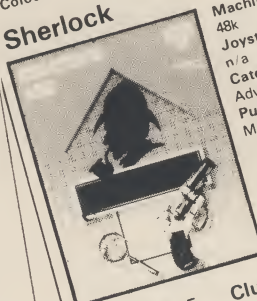
Price: £10.00

...cult adventure from Automata
...that will keep you busy for
...months? No, probably years.
...featuring the Pi-Man and some
...very high quality, amusing graphics
...too (also a free hit single and a
...chance to win £6,000).

Ratings: /10
Graphics: 7
Sound: 4
Colour: 4

Originality: 8
Interest: 6
Order code: PIMAN

Sherlock



Machine:
48k
Joystick:
n/a
Category:
Adventure
Publisher:
Melbourne House

Price: £14.95 Club price: £12.95

Not at all elementary, my Dear
Watson!
You play the character of Holmes,
while other characters behave
according to their own personality.
The game uses a technique called
'English' which allows you, Holmes,
to talk to the other characters to
obtain information and crack the
case! Throughout the game, time
is displayed by a clock on the
screen and the detail is
unbelievable; for instance you can
travel from Baker Street in a taxi to
your destination but you must call
the taxi, tell him your direction of
travel and then pay him! The large
vocabulary allows many different
commands to be given, but you
must remember to leave time for
Holmes to sleep! The game shows
both text and graphical
representation on the screen and
can last for up to a month by
saving it after each session. Superb
entertainment, brilliantly absorbing!

£8.45

g with
you
-zones,
will

Ratings: /10
Graphics: 7
Sound: n/a
Colour: 8

Originality: 10
Interest: 10
Order code: SHERL



Machine:
48k
Joystick:
Kempston
AGF
Protek
Interface II
Category:
Arcade Adventure
Publisher:
Software Projects

Price: £5.95

Club price: £4.55

Willy the Miner has fallen down a
disused mine shaft. He works his
way through the various levels
collecting treasure. Manic Miner is a
secret treasure game for the
Spectrum—There are 20 caverns to
penetrate, each requiring its own
bit of ingenuity to ensure success.
A classic game that sets the
standard others will be judged by.

£4.55
ual to
gone
Willy
as he
and
his
him
beach,

graphics
ake this
pectrum.

y: 9
8
de: JETSE

Machine:
48k
Joystick:
No
Category:
Arcade Adventure
Publisher:
Phoenix Software

BONUS
£3.45
PRICE

Club price: £5.60

ue for money
mes for the price
is arcade style,
ure.

o defeat your
e travelling the
ed as magicians.
air which they travel
et up on earth.
een hypnotising
arthlings, who are
d of their souls. The
power lies in a pack
ards, which you must
'first in the arcade
' the adventure.
an play the adventure,
reach at least level 4
e game. From here on,
on of each level further
e in the adventure are
hose of you whose
venture playing skill is
p to scratch there is a
ic-Packet', which
seful clues to help your
Good value.

Originality: 8
Interest: 7
Order code: JOKWI

Make your own economy cut this Christmas!

Simply cut out the coupon
and post to:

FREEPOST
(MEMBERSHIP DEPT.)
LOGIC 3
MOUNTBATTEN HOUSE
VICTORIA STREET
WINDSOR
BERKS.

Machine:
48k
Joystick:
No
Category:
Strategy
Publisher:
Melbourne House

BONUS
£4.95
PRICE

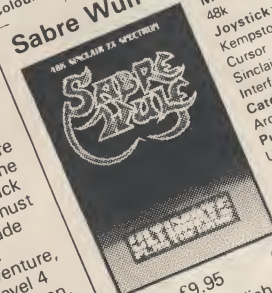
Club price: £5.55

From the publishers of the top
selling adventure—The
Hobbit—comes their newest
release, MUGSY. The game can
best be described as a comic strip
featuring animated characters.
As Mugsy, you must organise your
gang and their dealings—such as
protection rackets and the
purchase of weapons and
ammunition, and most important of
all make sure that your gang stays
on top.

Ratings: 10
Graphics: 9
Sound: 9
Colour: 8

Originality: 10
Interest: 9
Order code: MUGSY

Sabre Wulf



Machine:
48k
Joystick:
Kempston
Cursor
Sinclair
Interface II
Category:
Arcade Adventure
Publisher:
Ultimate

Price: £9.95

Club price: £8.45

From the publishers of Spectrum
classics such as Atic Atac and
Lunar Jetman now comes SABRE
WULF, an arcade/adventure epic
set in the deepest jungle.
The deeper you explore, risking life
and limb, the more challenges you
face: hippos, rhinos, warthogs,
tarantulas, bats and at least 30

Originality: 8
Interest: 7
Order code: JOKWI

Yes, please
rush me a copy of
your Software Club catalogue

I have a ☐ ZX Spectrum ☐ Commodore 64
(tick box)

Name

Address

American Football



Machine:
48k Spectrum
Joystick:
No
Category:
Strategy
Publisher:
Argus Press

Price: £9.95 Club price: £8.45

American Football is a strategic simulation, with fast animated physics. You do not control individual players but instead the whole team responds to your instructions. The action takes place on the pitch which occupies the top of the screen. Beneath the pitch is the scoreboard that gives all the relevant information: the quarter being played; minutes remaining, etc. This is also where you enter your commands. Play can be against the computer or another opponent. A complex game, but nevertheless great fun to play, supplied with a full guide to American Football and comprehensive instructions.

Ratings: /10
Graphics: 7
Sound: 6
Colour: 6
Originality: 9
Interest: 7
Order code: AMEFO

Pool



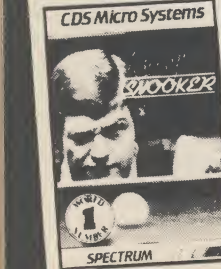
Machine:
ZX Spectrum,
16/48k
Joystick:
No
Category:
Simulation
Publisher:
CDS Micro
Systems

Price: £5.95 Club price: £4.45

A really excellent simulation of the game of Pool using the full sound and colour graphics capabilities of the Spectrum to bring the action and excitement of the real game into your home. Use your skill and judgement, and play like the professionals. 1 or 2 player game and demo mode. The only pool game worth considering for your 16 or 48k Spectrum.

Ratings: /10
Graphics: 8
Sound: 8
Colour: 8
Originality: 9
Interest: 10
Order code: POOL

Steve Davis Snooker



Machine:
48k Spectrum
Manufacturer:
CDS
Microsystems

BONUS
£5.45
PRICE

Price: £7.95 Club price: £6.75

After the incredible success of Ocean's Decathlon, which must in part have been due to the words

comes "Steve Davis Snooker". Apart from his signature on the cover there are no other signs of interference by Steve, but that doesn't in any way detract from the game, which is an excellent piece of programming. A feature we liked—though it is cheating a bit—is that you can go back and re-take your last shot! When you've just sunk the black when you were aiming for the yellow that's a useful feature! Ball control is excellent. You have full control over angle, power and spin and the

movement is really smooth. With Currah speech connected the referee makes comments like "Ladies & Gentlemen quiet please", or "foul", plus a few others that are totally incomprehensible. All in all this is an excellent simulation with smooth movement and very controllable ball action.

Ratings: /10
Graphics: 8
Sound: 8
Colour: 7
Originality: 8
Interest: 9
Order code: SDS

ARCADE SIMULATION

Do you yearn to drive a racing car, compete in the Olympics, or perhaps stand, pint in hand, competing against Eric Bristow and scoring "One hundred and Eighty's" time after time? If so, then you should find an Arcade/Simulation that'll fulfil your ambition—if not in reality, then in excitement and fun. Here we give a selection of the best—chosen not only for their accuracy but also for added touches like the way the athlete reacts to success or failure in Daley Thompson's decathlon, or the scurrying around of the ball-boys in Match Point. Features like these demonstrate imagination on the part of the author just as much as programming skills.

Beach Head



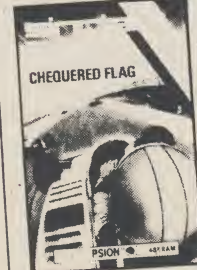
Joystick:
Optional and
redefineable keys
Category:
Arcade
Simulation
Strategy
Publisher:
Access

Price: £7.95 Club price: £6.45

Beach Head is a potent combination of arcade action, simulation and strategy, resulting in one of the most exciting and most realistic games currently available for the Spectrum. As Admiral of the Fleet, you have to decide between a full frontal assault or whether to try a surprise attack, sending your fleet down a side channel which may be mined. As naval gunman, you face constant harassment from enemy fighters as you try to establish the range of the enemy's ships. Finally, as tank commander, you have to fight your way through the enemy held beach. If you like action you must get this game.

Ratings: /10
Graphics: 10
Sound: 10
Colour: 10
Originality: 10
Interest: 10
Order code: BEASP

Chequered Flag



Machine:
48k
Joystick:
None
Category:
Simulation
Publisher:
Psion Sinclair

BONUS
£2.95
PRICE

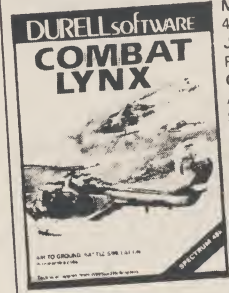
Price: £6.95 Club price: £5.45

The most sophisticated motor racing simulation available for the

Spectrum. Choose from ten tracks including Monaco, Brands Hatch and Silverstone and from three cars, one automatic and 2 with manual gearchange. Instruments include speedo, rev counter and fuel gauges. As you drive around the 3D track you can see the nose of your car, the wheels and steering wheel turning, and the road ahead. Very impressive 3D graphics, if you enjoy 3D simulations, you must add Chequered Flag to your collection.

Ratings: /10
Graphics: 9
Sound: 5
Colour: 6
Originality: 9
Interest: 10
Order code: CHEFL

Combat Lynx



Machine:
48k Spectrum
Joystick:
Protek
Category:
Arcade/
Simulation
Publisher:
Durel Software

BONUS
£5.95
PRICE

Price: £7.95 Club price: £6.75

Probably the most comprehensive real-time battle simulation available for your home computer. Combat Lynx can be played simply as an arcade game or more complexly as an arcade simulation. In the air-to-ground battle you are at the controls of a Lynx helicopter. You can select anti-tank, anti-aircraft missiles, machine guns or mines to arm your 'copter with. Your mission is to support your ground forces and to protect your ground bases. The number of bases depends on which of the 4 skill levels you choose. From the pilot's seat in your Lynx you get a spectacular 3D view of the landscape and enemy troops. Around your view panel there are comprehensive instruments

showing altitude, temperature, speed, fuel, weapon and navigation information. An excellent 3D game featuring very smooth, realistic graphics. Recommended.

Ratings: 10
Graphics: 9
Sound: 8
Colour: 8
Originality: 9
Interest: 8
Order code: COMLY

Daley Thompson's Decathlon



Machine:
48k
Joystick:
Kempston
Sinclair
Category:
Arcade
Publisher:
Ocean

BONUS
£4.95
PRICE

Price: £6.90 Club price: £5.85

Competing against the computer you are Daley Thompson, facing ten gruelling events. On the first day you can choose to compete in the 100 metres, long jump, shot-put, high jump and 400 metres. The second day's events are the 110 metres hurdles, discus, pole-vault, and the 1500 metres. In the running events you animate Daley by either pressing two keys alternately, or rapidly moving the joystick from side to side. In the hurdles you press the fire button to jump. The throwing events require a little more skill and timing and a little less finger stamina! In the long jump, after a good run up try to get a take-off angle as near to 45 degrees as possible. In the high jump, judge your take-off and the right time to fall, without knocking off the bar. In the pole-vault get the pole as close to 90 degrees as you can and plant it in the right place. In the javelin and discus work up a really powerful throw and remember to release it on time! There is a comprehensive on screen score board showing world records, qualifying times, etc. the graphics and animation are good and keyboard play is very responsive. Novel touches, like the officials coming out and measuring long jumps, the crowd cheering, and Daley scratching his head or leaping around, add to the enjoyment of a good game.

Ratings: /10
Graphics: 8
Sound: 7
Colour: 8
Originality: 6
Interest: 9
Order code: DALSP

Darts



Machine:
48k
Joystick:
No
Category:
Simulation
Publisher:
Automata

Price: £5.00 Club price: £4.00

At last—a good simulation of darts for your home computer. Aim carefully at the board but take into account the number of pints you've had tonight, and the crowd

LOGIC3

a black. When you have the correctionation rush along to the stan and reach into the safe. The safe has been openegame musn't be given away a flashing shields so stop tall flashing by hitting them.

A reamusing game with many humitouches that makes it great to play. Teachers will show you, and give you lines. The school bully and a swot (Eir) who tries to tell the head of mission.

Highly commended.

Rat 10
Gra 9
Se 9
C 10

Originality: 10
Interest: 10
Order code: SKODA

Pyramid



Machine:
48k
Joystick:
Fuller Kempston
AGF Protek
Microgen
Category:
Arcade/Adventure
Publisher: Fantasy

BONUS
£2.95
PRICE

Club price: £4.15

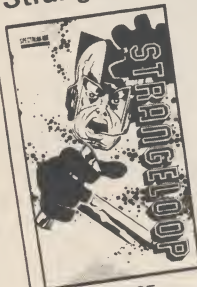
Price: £5.50

Guide Ziggy, equipped with defence shield and phased plasmic laser, through the Pyramid, which consists of 120 chambers on 15 levels. Each chamber is inhabited by one of 60 varieties of weird creatures and aliens, ranging from galactic strawberries to demons and cosmic claws to mutant eyes. This arcade game will continue to amaze you for months, if not years!

Ratings: /10
Graphics: 7
Sound: 4
Colour: 7

Originality: 8
Interest: 8
Order code: THEPY

Strangeloop



Machine:
48k
Joystick:
Any
Category:
Arcade/Adventure
Publisher:
Virgin Games

Club price: £5.90

Price: £6.95

A mammoth arcade/adventure with 240 rooms. The scene is an old robot factory, that used to produce domestic robots. That was until about a hundred years ago, when the factory was taken over by powerful alien forces. Since then no human has set foot in the factory, until now!!! Your mission is to regain control of the factory, as the robots have been reprogrammed to destroy Earth. Your only protection against the extremely hostile environment of the factory is your old "10th generation" space suit. The suit is constantly being torn and punctured by razor sharp industrial waste. If you're lucky you may find some patches lying around. You also have a laser, with a limited number of charges. The top two-thirds of the screen is the playing area, which displays one of the 240 rooms. The rooms

Games for Children



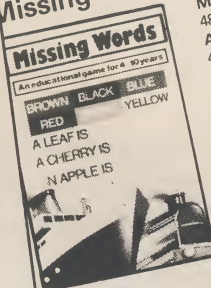
Machine:
16/48k
Age range:
3-8 years
Category:
Education
Publisher:
Stell

Club price: £5.25

set of four educational games provides excellent value for money—se—a series of different objects are displayed on the screen (bed, etc.) You must decide in which room each object belongs, move it there. **Word game**—guess which word is in the balloon. Watch it fill with your when you type in the right answer. You can also add your own words and save them. **Picture**—can you identify the picture? Watch it move across the screen when you guess the right answer. **Maze**—find your way through the maze and reach the dog—7 levels.

Order code: MFC

Missing Words



Machine:
48k
Age range:
4-10 years
Category:
Education
Publisher:
Stell

Club price: £5.25

Price: £6.95

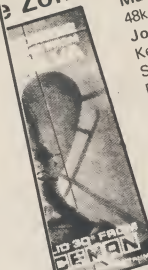
Two entertaining sections teach reading and English comprehension. **Section one** displays single sentences with a word missing in each. The child must choose the correct word to fill the gap, from a choice of six words. Only two keys are used in this section, making it simple for even the youngest child. **Section two** takes the theme one stage further. Now a full story is displayed on the screen with at least ten missing words in it. The child must decide which word should be used to fill in the gap, and type this in. In both sections, a large number of different sentences and stories can be selected. Section two even allows you to type in your own story—e.g. your child's favourite nursery rhyme.

Order code: MISWO

WIN A MICRODRIVE

For details on how to win our Christmas Competition for a Microdrive and Interface 1, please refer to Page 14.

Zombie



Machine:
48k
Joystick:
Kempston
Sinclair
Protek
Category:
Arcade/Adventure
Publisher:
Quicksilver

Club price: £5.90

Amazing game that features harvellous firsts for the um. For the first time 3D graphics are available in and Zombie Zombie also es the first two channel on the Spectrum. ame is set in the city of the es, in which you arrive by pter. When you find a le place for landing, you can the helicopter and the action is.

can move in any direction and un marginally faster than the bies, but there are a lot of bies and many are hidden nd the various maze-like walls he city. The Zombies are frail tures and can be blown y—this is your only defence inst them. However as soon as y get a taste of your flesh, their length improves dramatically. a part of the city that you are n be viewed from 4 different gles, and by using a helicopter drop or pick up bricks the city n be changed infinitely, and fferent cities can then be saved n tape and loaded at another me.

very impressive program, unning 3D graphics and excellent ound effects.

Ratings: /10
Graphics: 9
Sound: 8
Colour: 8

Originality: 8
Interest: 9
Order code: ZOM20

ON

expeditious flow of air-traffic; safe in that all aircraft must be kept apart, and expeditious so as to avoid undue delay. The work of an air traffic controller is very skilled and demanding, they each undergo about 3 years basic training. It is not surprising, therefore, that it may take some time to master the many tasks involved in this very realistic simulation.

Ratings: /10
Graphics: 9
Sound: N/A
Colour: 8

Originality: 10
Interest: 9
Order code: ATC

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Advertisement Index

Activision85
AGF146, 147
AMS35
A 'n' F126, 127
Antique Master21
Atarisoft178, 179

Betasoft103
Beyond194
BJ Binders141
Brother36
Bud Computers53
Buffer Micro103
Bug Byte46

Cambridge Micro Electronics160
Campbell Systems127
Cascade24
CCS13
Century4
Challenge Research67
Cheetah Marketing23, 102
Cheetah Soft193
CK Computers34
Compusound68, 83
CP Software101
Cross Software141
Currah93

DACC136
Database186, 187
Data Efficiency78
Datapen175
Datel7
Digital Integration96
Dk Tronics6, 33
Dorcas80

East London Robotics82

Fantasy60
Firebird86, 87
Force Astro142
Fox Electronics132
Frel160
Frontrunner69

GCE Tutorial143
Gilsoft158

Hago109
Hewson51, 175
Hill MacGibbon128
Hutchinsons130

Incentive14
Infrascop176
Interface8

Kelwood18
Kempston Micro-Electronics43
Kosmos136

Level 9162
Logic 3202, 207
Logotron156

Melbourne House145, 153
Memorex74, 75
Micronet170, 171, 174
Mikrogen137
Modular Resources88
Monitor177
National Computer Club56, 57
New Generation21, 154, 155
Nordic49

OCP11, 62, 63
OceanIFC, 169
OEL84, 140, 141

Pan Books134
PAS95
Picturesque8
Prism70, 71
Protek121
Punters Pal34

Quest45
QuicksilverOBC

Racol71
Rainbow Electronics126
RAM Electronics77
RAM Jam125
Realtime61

Saga Systems111
Selec8
Silicon City68
Softach185
Software Farm112
Software Library136
Software Supermarket131
Southern Software104
Spectadraw103
Statacom126
StatesoftIBC
Stonechip188
Streetwise124
Swoppatape144

Talent140
Tasman152
Technical Research66
TEC Publications34
Thorn-EMI/Creative Sparks68, 83, 110, 143
Thoughts and Crosses161
Transform148, 158
TRI175

Ultimate117-120
University Software132
US Gold40, 41

Verran95
Vortex94
Vulcan135

Walkers177
Watford Electronics72
Websters161

Zeal Marketing81
ZX Microfair163



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